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MONTHLY NOTICES

OF THE

ROYAL ASTRONOMICAL SOCIETY.

VOL. LIX. No. 7. APRIL 1899.

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MONTHLY NOTICES

OF THE

ROYAL ASTRONOMICAL SOCIETY.

VOL. LIX. APRIL 14, 1899. No. 7

Professor G. H. DARWIN, M.A., LL.D., F.R.S., President, in the Chair.

Ernest William Barnes, B.A., Trinity College, Cambridge ;
Samuel Chatwood, F.R.G.S., Broad Oak Park, Worsley, near Manchester ;
Rev. W. B. K. Francis, H.M.S. *Boscawen*, Portland ; and
Capt. Windeyer George Lingham, 1 Caldervale Road, Clapham, S.W.,

were balloted for and duly elected Fellows of the Society.

The following Candidate was proposed for election as a Fellow of the Society, the name of the proposer from personal knowledge being appended :—

Frederick Evan Peach, Schoolmaster, 161 Stanstead Road, Forest Hill, S.E. (proposed by J. E. Evans).

Eighty presents were announced as having been received since the last meeting, including, amongst others :—

Astronomici Veteres, Venetiis (Aldus), 1499, presented by W. Arthur Smith ; Dunsink Observations, Part VIII., presented by the Observatory ; Greenwich Observations, 1896, presented by the Observatory ; Moore's Almanac, 1865–94, presented by Rev. S. J. Johnson ; Palisa und Bidschof, Katalog von 1238 Sternen,

auf Grund der Meridiankreisbeobachtungen der von Kuffner'schen Sternwarte, presented by the authors; Pulkowa Observatory, Ascensions droites moyennes des étoiles principales, par A. Sokolov, presented by the Observatory; H. Struve, Beobachtungen der Saturnstrabanten, presented by the Pulkowa Observatory; Venus Durchgänge, 1874, 1882, Bericht über die deutschen Beobachtungen, Band I., herausg. von A. Auwers, presented by the German Transit of Venus Commission; L. Weinek, Photographischer Mond-Atlas, Heft 4, presented by Professor Weinek.

Observations of Hind's Variable Nebula in Taurus (N.G.C. 1555), made with the 40-inch Refractor of the Yerkes Observatory. By E. E. Barnard.

In *Monthly Notices, R.A.S.* for 1895 June, I have given a historical account of the celebrated variable nebula of Hind (N.G.C. 1555).

This object was discovered by Mr. J. R. Hind 1852 October 11, at Mr. Bishop's Observatory, London, and his original account of the discovery will be found in *A.N.*, No. 839.

When discovered by Hind, and for some years subsequently, this nebula was a conspicuous object in an ordinary telescope, It was seen and measured by D'Arrest, Struve, and Lassell, and was close south, preceding a small star since known as the variable *T Tauri*.

About 1860 the nebula had disappeared in ordinary telescopes, and by 1868 it seems essentially to have also vanished from the largest instruments.

In 1868 Struve found another small nebula 4′ preceding the place of Hind's. This object was afterwards observed by D'Arrest and Tempel. The latter saw this nebula 1877 November 8. It was $1\frac{1}{2}'$ in diameter, with a small star in the northern portion of it. On December 12 of the same year it had disappeared from Tempel's telescope, but two small stars were visible at its place, the northern of which was the one seen on November 8 in the nebula 40″ south, following the centre.

These objects seem to have been neglected after this until the fall of 1890, when Mr. Burnham took up the subject with the 36-inch (*Monthly Notices*, 1890 December, also *Pub. L.O.*, vol. ii., p. 175). I was kindly invited by him to share in the observations.

From the fact that he found *T Tauri* to be the nucleus of a small extended nebula, and that, by a singular coincidence, that star's position in the D.M. was erroneous by a quantity that made it exactly coincide with the position of Hind's nebula, Mr. Burnham concluded the star with its nebulosity was the variable nebula

itself. While observing with him, I detected a very faint round nebula, close south preceding the star, and entirely disconnected from it. This nebula was supposed by us to be new and unknown, as it was unlikely that any other telescope could have shown it.

Remembering this nebula a few years later, it occurred to me to look it up and determine its position. It was therefore sought for on 1895 February 25, and was easily found. It appeared somewhat brighter than in 1890, and was an easy object. (It was actually seen on February 26 with the 12-inch.) I measured its position with reference to *T Tauri* and, upon looking up the place of that star, found to my surprise that the position in the *D.M.* was in error. With the true place of *T Tauri* my nebula came out identical in position with Hind's variable nebula of 1852 ! To my further surprise I found that the very definite and brightish nebula, which Mr. Burnham had found *T Tauri* the nucleus of, and which I had seen with him, had entirely disappeared ! There seemed to be, however, some feeble traces of nebulosity surrounding the star, but the distinct nebula of 1890 was gone.

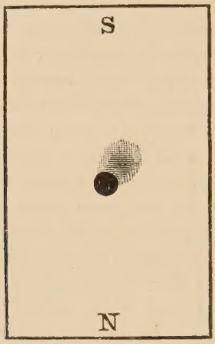
At no time could either Mr. Burnham or I see any traces of Struve's nebula, 4′ preceding these objects, though we looked carefully for it. In my observations of 1895, however, I measured a small star that essentially occupied the place of Struve's nebula, and which was undoubtedly the brighter of the two mentioned by Tempel in 1877, and which D'Arrest had spoken of previously as being the eccentric 14-mag. nucleus of Struve's nebula ; but I did not see any second star.

This region was again examined with the 36-inch in the following September, on the 15th, 22nd, and 23rd, under the very finest conditions. No trace of Hind's nebula could be seen. It had absolutely disappeared in the great telescope. Every effort was made to see it, by occulting *T Tauri*, by the use of different magnifying powers, &c. (*Monthly Notices* for 1895 December). *T Tauri* itself seemed unchanged from its appearance in the previous February and March. Nothing was visible of Struve's nebula. A second and much fainter star, however, was seen south of the small one previously measured at this point, and this must have been the second of Tempel's stars. It was at the limit of the 36-inch under the finest conditions, and was estimated at 17th magnitude. This small star must therefore have faded greatly since Tempel's observations of 1877, for it would have been impossible for him to see it with 11 inches aperture.

I have thus briefly sketched the history of this singular region as a prelude to my observations of it here with the 40-inch. I would, however, refer those interested in the matter to the more detailed papers in *Monthly Notices* for 1895 June and December.

One of the first things examined here with the 40-inch was *T Tauri* and the region of Hind's and Struve's nebulæ. These observations were begun 1897 September 20. The seeing on

this date was fair, but there was no trace of either of these nebulæ, and *T Tauri* appeared unchanged. The brighter of the two small stars was seen at the place of Struve's nebula.



T Tauri, 1897 September 22, &c.

On September 22 no trace of either nebula was seen, though the conditions were fair. But, upon close examination, *T Tauri* was seen to have a very small and very close nebulous patch attached to it on the following side. This was seen with various magnifying powers. At first the star appeared to be double, but the higher powers showed the appearance to be due to a very small nebula or nebulous patch very close south following the star, perhaps from 1″ to 2″ distant.

September 26, Mr. Burnham and I examined *T Tauri* and the region of Hind's and Struve's nebulæ. No trace of these objects was seen. *T Tauri* appeared as in the observations of 1895. Nothing whatever was seen of the small brightish nebula in which it shone in 1890. The seeing was not quite good enough to see the small nebulous patch of September 22.

September 28, with good seeing, Hind's nebula could be very faintly seen, but with the utmost difficulty, occupying the position of 1890 and 1895. It was excessively faint and difficult, but seen with certainty; it was at the limit of vision, and could not have been brighter than the 17 magnitude. The small nebulous patch close s.f. *T Tauri* was seen. No trace of any nebulosity existed at the place of Struve's nebula. The small star at that point seemed considerably brighter than formerly. The small star south of this was visible, but it was excessively faint and at the limit of vision. Its position was measured with reference to the brighter of the two.

Position angle, 193°·2 (3); distance, 18″·25 (3). The measures were made with the utmost difficulty.

October 26. Sky too thick, but the brighter of the two small stars was visible.

November 2. Sky white from moonlight. Could see the fainter of the two small stars (as also the brighter one), but with the utmost difficulty. Sometimes this very faint star appeared like a very faint, very small nebula 1″ or 2″ in diameter. This, however, was uncertain. It also appeared nebulous to me with the 36-inch in September 1895. But an observation of this kind, at the limit of vision, cannot be depended on.

November 23. Sky thick, and the seeing too bad to make out anything.

1897 December 25. Examined very carefully ; nothing seen of the Hind or Struve nebula. The two small stars were visible however—the faint one for only a moment.

1898 September 26. Perhaps faint traces of Hind's nebula could be made out, but not with any certainty. The two small stars at the place of Struve's nebula were visible—the northern one quite bright, the other excessively faint.

October 10. No trace of Hind's nebula with any certainty. The northern of the two small stars pretty bright—11^m or $11\frac{1}{2}^m$. Seeing fearfully bad ; the stars boiling.

December 10, $7^h\ 40^m$. Only the vaguest glimpses of Hind's nebula made out, but it was certainly seen by hiding *T Tauri*. Conditions were fairly favourable. The two small stars were visible, but nothing of Struve's nebula. The south star was excessively faint, but was fairly well seen. Observed again at $11^h\ 30^m$, but seeing too poor to do anything.

I have never seen anything of the two small stars shown in Tempel's sketch in *Ast. Nach.* 2212 close north preceding *T Tauri*.

In conclusion, we have evidence that Hind's nebula still exists, but in a most excessively faint condition in the most powerful telescope under the very best conditions.

It is possible that these glimpses of the nebula seen here are due to slight fluctuations in its light. The observations of 1895 show that from an easily visible object in February and March of that year it had utterly disappeared in the same telescope (36-inch) six or seven months later. It was brighter in 1895 than in 1890.

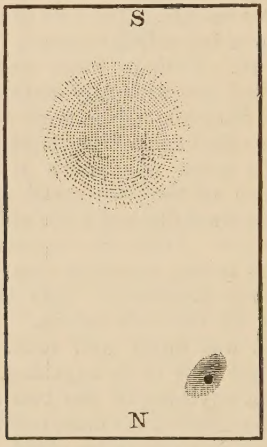
Whether its visibility in 1890 was due to an increase of its light after it was lost sight of many years before, or was simply due to the more powerful telescope, we have no means of telling. But it had certainly brightened up in the spring of 1895, and as certainly faded very greatly soon after that.

Whether the light of this nebula is approaching absolute extinction, or is simply subject to great fluctuations, will be an interesting question for the future to decide.

From the early accounts of the nebula, one is impressed with the idea that it had not long been of its brightness when Hind found it in 1852. If so, we should probably again see it with small telescopes. It is, therefore, worthy of a close watch. At present this must be done with powerful telescopes, for it is of that class of nebulæ which are best seen in a large telescope.

From the glimpses I have had of it lately, its faintness does not seem to be due to diffusion of its light over a larger area; it seems to be of the same size as formerly, and to have simply diminished in visibility through an actual loss of light.

I have lately found a note and sketch concerning the appearance of *T Tauri* and Hind's nebula at the observations of 1890 which should have been incorporated in my paper in the June 1895 *Monthly Notices*. As a matter of record it is well to introduce these in the present paper.



Sketch of *T Tauri* and Hind's Nebula 1890 Oct. 15.

"1890 October 15 at $13\frac{1}{2}^{h}$. Mr. Burnham and I looked at the place of Hind's variable nebula in *Taurus* with the 36-inch. There is an elongated pretty bright stellar nebula, very small, which Mr. Burnham saw the other night and measured [this was *T Tauri*]. I saw an extremely faint round diffused nebula $\frac{3}{4}'$ diameter almost due south of it [*T Tauri*], estimated position angle 185°, distance $\frac{3}{4}'$. It was feebly brighter in the middle. We saw nothing at the place of Struve's object 4′ preceding what we have assumed to be Hind's nebula [*T Tauri*]."

Yerkes Observatory, Williams' Bay, Wisconsin:
1899 *January* 27.

Periodic Variation in the Colours of the two Equatorial Belts of Jupiter. By A. Stanley Williams.

The very beautiful and often very pronounced colours of the belts of *Jupiter* have long attracted the attention of observers. When observing the planet in the year 1879 with a $2\frac{3}{4}$-inch refractor I was much struck by the colours of the two equatorial

belts. The north equatorial belt was then intensely red, whilst the south equatorial belt was not only devoid of all red colour, but was actually bluish. Two or three years later both belts were reddish coloured; whilst in 1884 the tints of 1879 were reversed, the south equatorial belt being now intensely red and the north equatorial belt bluish. These changes seemed so curious that I have since kept a nearly complete record of the colours of these two belts extending up to the present time. Subsequent to 1892 a definite scale has been used to express the degree of redness of the belts, ranging from 1 (the feeblest possible tinge of red) up to 10 (the reddest markings observed on the planet *). Previous to that year there are only verbal descriptions of the colours. These observations have all been recently reduced, in as uniform a manner as possible, by converting these verbal descriptions into terms of the numerical scale. The observations, when thus reduced, showed marked maxima and minima of redness, separated by intervals of about twelve years, and so arranged that the maxima of the south equatorial belt synchronised with the minima of the north equatorial belt, and *vice versa*.

These results were so decided and seemed so remarkable that I have treated all the accessible contemporaneous records in the same manner, namely, by converting the verbal descriptions of the colours into terms of my numerical scale. Every effort was made to make this part of the work as independent and free from bias as possible, and with this view care was taken not to make any comparison with my observations until those of other observers had been first reduced. The labour involved in this reduction has been considerable, there being an enormous mass of published and unpublished material, which all had to be carefully gone through.

When the results subsequent to 1878 had all been reduced in this manner, the earlier observations were treated in the same way. This part of the work, however, is not so complete as the later portion, as I have only been able to make a superficial search through the records of this period, and the observations available are not very numerous. Nevertheless, there is a continuous, and more or less perfect, record of the colours of the two belts down to the year 1867. Previous to this year there are, however, only a few isolated results until we come to a very remarkable series of observations by Gruithuisen. This observer has published a continuous record of the colours of the belts, extending from 1836 to 1846, illustrated by coloured drawings.

The results of these researches are embodied in the following table, in which the first column gives the date, and the second the mean degree of redness of the north equatorial belt. The third and fourth columns give the corresponding data for the south equatorial belt, whilst the last column contains references

* Namely, the red spot when at its reddest, and the short intensely red streak which was visible on the south temperate belt in 1891.

to the authorities on whose observations the results depend. Two figures joined by a hyphen in columns two and four indicate that the mean redness falls nearly midway between the two.

Mean Redness of the Equatorial Belts.

N. Equat. Belt.		S. Equat. Belt.		
Date.	Redness.	Date.	Redness.	Observers.
1786·74	3†	1786·74	3†	S.
1792·26	3	1792·26	3	S.
—	—	1835·91	4	Sc.
1836·36	0	1836·36	5	G.
1837·05	2	1837·05	4	G.
1838·04	3–4	1838·04	3–4	G.
1839·33	3	1839·33	3	G.
1840·25	3	1840·25	3	G.
1841·60	3	1841·60	3	G.
1842·25	4	1842·25	0–1	G.
1843·50	5	1843·50	0	G.
1844·44	3–4	1844·44	2	G.
1845·52	4	1845·52	2	G.
1846·56	2–3	1846·56	2–3	G.
1860·05	3†	1860·05	3†	Hl.
1862·31	3	1862·31	3	We.
1867·70	5*	1867·70	0	Gr.
1868·60	4†	1868·60	1†	Bu.
1869·64	3	1869·64	3–4	Bu., Bg., By., Gr., Ma., Sa.
1870·95	3†	1870·95	3†	Bg., Bi.
1872·03	2	1871·98	3	Bg., Bi., L., La.
1873·16	1	1873·25	5	Co., Gr., Kn., L.
1874·23	2†	1874·25	3†	Br., Gro., Kn., L.
1875·33	2–3†	1875·33	2–3†	Br., L.
1876·53	3	1876·52	3–4	Br., L., Hi., Td., Rd., Rl.
1877·50	4	1877·52	3	Br., D., Hi.

* The only observation is one by Mr. N. E. Green, who states that "the northern belt was very dark and brownish in colour; while the southern, though broader, was faint and grey." As Mr. Green usually describes the red colours less pronounced than do other observers, and, indeed, shows perhaps a partiality for bluish tints, I have entered the redness of the N. Equat. belt as 5 on the scale, though there is necessarily considerable uncertainty as to the exact figure.

† Results marked thus are only approximate, the observations available being insufficient to allow of a satisfactory estimate of the degree of redness to be made

N. Equat. Belt. Date.	N. Equat. Belt. Redness.	S. Equat. Belt. Date.	S. Equat. Belt. Redness.	Observers.
1878·58	4	1878·62	0	C., D., L., N.
1879·72	5	1879·71	0	Bar., Br., Bt., D., Kt., L., N., T., W.
1880·70	5	1880·73	1	Bar., Ca., D., Fe., L., N., Rl., W.
1881·87	3	1881·87	1	B., Ba., C., E., Gt., Gy., N., T., W.
1882·93	0–1	1882·94	4–5	B., Be., Gr., Gt., T., W.
1884·05	0	1884·01	5	B., E., Fr., Ge., Go., Mg., O., Ri., T., W.
1885·24	3	1885·22	4	B., Ge., Le., Mi., Pe., Pr., Sm., T., W.
1886·20	3	1886·18	3	B., T., W.
1887·36	3	1887·36	3	T., W.
1888·30	3–4	1888·40	5*	W.
1889·45	3	1889·45	3	Ho., K., W.
1890·65	4–5	1890 67	1	Da., K., Me., Ry., Sm., T., W.
1891·72	6	1891·72	0	J., K., T., W.
1892·75	5	1892·78	2–3	A , Cr., Kl., M., W., Wa., Wh.
1893·85	4	1893·79	3	He., Me., W.
1894·83	4	1894·83	3–4	Bar., Bn., Da., W.
1895·85	3	1895·85	3	A., Cs., Ni.
1896·18	2	1896·15	4	Bn., F., Fo., Gf., Gl., M., My., P , R., W.
1897·29	0–1	1897·20	5	An., Cr., Da., Es., F., Fo., Gl., Gf., H., Ke., Ki., Q., R., Sh., Sm., To., W., Wa.
1898·29	4	1898·29	4	Ch., Cs., D., Gn., H., Hs., W.
1899·09	3	1899·09	3	P.W.

Abbreviations.

A. = E. M. Antoniadi.	Ca. = R. Capron.
An. = W. Anderson.	Ch. = H. Y. Childs.
B. = Otto Bœddicker.	Co. = R. Copeland.
Ba. = L. de Ball.	Cr. = H. Corder.
Bar. = E. E. Barnard.	Cs. = J. Comas Solá.
Be. = E. S. Beaven.	D. = F. C. Dennett.
Bg. = John Browning.	Da. = G. T. Davis.
Bi. = J. Birmingham.	E. = T. G. Elger.
Bn. = L. Brenner.	Es. = E. Essam.
Br. = T. Bredichin.	F. = P. Fauth.
Bt. = J. Brett.	Fe. = — Ferguson.
Bu. = T. H. Buffham.	Fo. = T. H. Foulkes.
Bw. = J. Brown.	Fr. = W. S. Franks.
By. = — Brindley.	G. = F. von P. Gruithuisen.
C. = G. Calver.	Ge. = S. M. B. Gemmill.

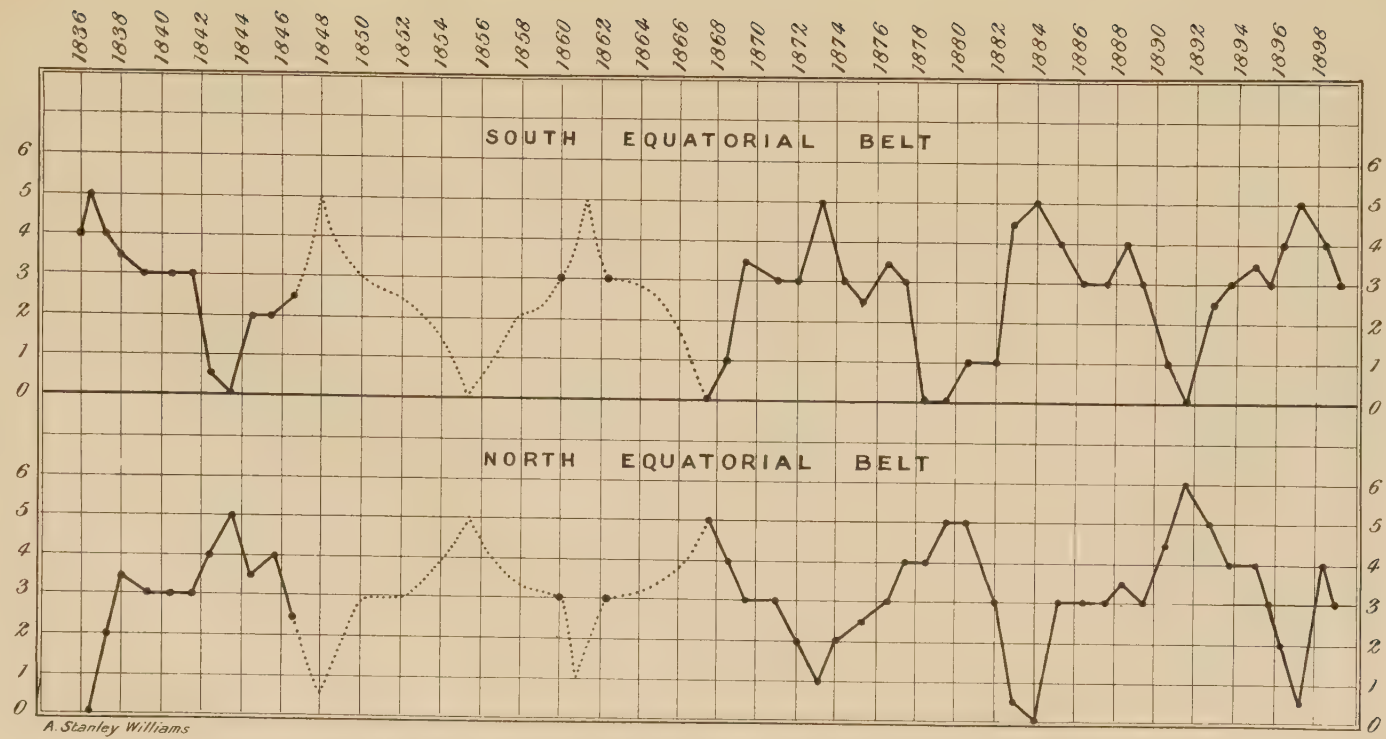
* This value is certainly too high. It is based upon six observations made by the writer alone, and about this time his estimates were generally considerably higher than those of other observers. Thus, in 1887 they were one above, in 1889 one above, and in 1890 two degrees of the scale above the values of the other observers. The value plotted upon the diagram accompanying this paper is 4.

Abbreviations—continued.

Gf. = H. F. Griffiths.
Gl. = J. Gledhill.
Gn. = W. Godden.
Go. = W. Goodacre.
Gr. = N. E. Green.
Gro. = C. Grover.
Gt. = — von Gothard.
Gy. = T. P. Gray.
H. = W. J. Hall.
He. = A. Henderson.
Hi. = G. D. Hirst.
Hl. = A. S. Herschel.
Ho. = E. S. Holden.
Hs. = E. Holmes.
J. = W. E. Jackson.
K. = J. E. Keeler.
Ke. = P. H. Kempthorne.
Ki. = R. Killip.
Kl. = H. J. Klein.
Kn. = E. B. Knobel.
Kt. = G. Knott.
L. = O. Lohse.
La. = W. Lassell.
Le. = R. G. Leigh.
M. = H. MacEwen.
Ma. = A. M. Mayer.
Me. = J. Meller.
Mg. = E. Mengering.
Mi. = A. F. Miller.
My. = K. Mysz.
N. = L. Niesten.
Ni. = A. A. Nijland.
O. = J. M. Offord.
P. = T. E. R. Phillips.
Pe. = T. Perkins.
Pr. = C. W. Pritchett.
Q. = F. Quénisset.
R. = J. Rheden.
Rd. = — Ringwood.
Ri. = A. Riccò.
Rl. = H. C. Russell.
Ry. = R. J. Ryle.
S. = J. H. Schroeter.
Sa. = E. Salter.
Sc. = H. Schwabe.
Sh. = C. F. Smith.
Sm. = D. Smart.
T. = F. Terby.
Td. = C. Todd.
To. = H. J. Townsend.
W. = A. S. Williams.
Wa. = W. R. Waugh.
We. = T. W. Webb.
Wh. = Mary M. Whitney.

The results contained in the preceding table have been laid down upon the accompanying diagram (see Plate 8), in which the horizontal lines represent degrees of redness according to the adopted scale. This diagram shows clearly the very striking variations in the redness of the two belts. The maxima and minima, it will be observed, are particularly well marked, and it is remarkable how the maximum redness of one belt always synchronises almost exactly with the minimum redness of the other. The range of variation is in reality even greater than that shown by the diagram, since at the time of minimum most observers describe the belts as appearing distinctly bluish, whereas both in the diagram and the table no account has been taken of this bluish tinge. The degree of redness at the times of maximum is also probably underrated, since there are usually some observers who notice the red colour at such times, but who are relatively deficient in colour perception. In some maxima, at least, the red colour has certainly been little inferior in intensity to that of the red spot when at its reddest. The belts at such times bear considerable resemblance to a bar of red-hot iron.

Where the observers are so numerous, there is naturally some diversity at times in the exact tints or degree of redness. This is more especially the case in the intermediate stages, when the red colour is not very deep. But at the times of maxima and minima the colours are so pronounced and strikingly contrasted that the observers are then practically all in agreement. There are a



COLOUR CHANGES OF JUPITER'S BELTS.

few instances of observers being apparently deficient in colour perception, and one or two cases which are suggestive of colour blindness.

As already stated, the time of maximum redness of one belt corresponds to the minimum of the other. The diagram shows that this correspondence is so exact that for the purpose of computing the period of variation it will be sufficient for all practical purposes to consider the variations of one belt only. There are eight observed maxima and minima, the times of which are given below.

Observed Times of Maxima and Minima.

N. Equat. Belt.		S. Equat. Belt.
Minimum	1836·36	Maximum
Maximum	1843·50	Minimum
Maximum	1867·70	Minimum
Minimum	1873·22	Maximum
Maximum	1879·72	Minimum
Minimum	1884·03	Maximum
Maximum	1891·72	Minimum
Minimum	1897·25	Maximum

These are the times corresponding to the extreme variations as actually observed, as it is doubtful whether any improvement in these times would result from consideration of the form of the colour curve. In a few cases, where there is a slight difference between the times for the two belts, the mean of the two has been taken.

From the four observed minima of the north equatorial belt the mean period of variation, derived by the method of least squares, is 12·14 years; and from the four maxima the mean period is 12·03 years, with the following residuals C−O in each case.

Minima. Years.	Maxima. Years.
−0·07	+0·09
−0·51	−0·05
+0·82	−0·04
−0·26	−0·01

The mean of these two values is 12·08 years. According to Professor Young's *General Astronomy* the length of a sidereal revolution of *Jupiter* is 11·86 years. The above mean period of variation agrees so closely with this that it is probable, or at least possible, that in the long run the two exactly correspond. If future observation should show that this is actually the case, it would seem that the variation in colour is a seasonal phenomenon,*

* At present the colourless, or bluish, phase of a belt occurs a short time after the autumnal equinox of the hemisphere in which such belt is situated.

and that the solar influence upon the changes which we observe upon the surface of *Jupiter* is greater than has been generally supposed, notwithstanding the distance of the planet from the Sun and the small inclination of the plane of its equator to the plane of its orbit. It seems certain, however, that the variation in colour can have no relation to the Sun-spot period, as was at one time thought might be the case with regard to the changes of colour of the bright equatorial zone. It should be mentioned here that the colour changes observed by Mr. John Browning and others in 1869–72 are quite distinct from those investigated in this paper. The former related to the bright central zone comprised within the two dark equatorial belts, whilst the latter refer to the changes in colour of the two last mentioned dark belts. The interesting subject of the relationship of the colour changes of the other dark belts and bright zones to those now under consideration has not yet been fully worked out. It may be mentioned, however, that the variations in the intensity of the colour of the red spot may possibly have some connection with the changes of the two equatorial belts. The red spot was near a maximum of redness in 1879–80, and there were minor maxima in 1886 and 1892. In 1897 there was also perhaps a feeble temporary increase in redness. All these times nearly correspond to a maximum redness of one or other of the two equatorial belts. In 1873, also, the reddish colour of the spot attracted particular notice at Lord Rosse's Observatory. The peculiar "tawny" hue, which sometimes characterises the bright equatorial zone,* seems to occur chiefly at the intermediate phases, when both the equatorial belts are moderately red.

The results of the present investigation may be shortly summarised as under :—

(1). The S. equatorial belt varies in redness periodically, the period of a complete change being 12·08 years.

(2). The N. equatorial belt undergoes a similar periodical variation in colour, and in the same period.

(3). The variations are so related that when the S. equatorial belt is at a maximum of redness the N. equatorial belt is at a minimum, and *vice versa*.

(4). The formulæ for finding the times of maxima and minima are :—

$$\left.\begin{matrix}\text{Min. redness of S. Equat. Belt}\\ \text{Max. redness of N. Equat. Belt}\end{matrix}\right\} = 1867{\cdot}65 + 12{\cdot}08E. \quad \text{Years}$$

$$\left.\begin{matrix}\text{Max. redness of S. Equat. Belt}\\ \text{Min. redness of N. Equat. Belt}\end{matrix}\right\} = 1872{\cdot}71 + 12{\cdot}08E. \quad \text{Years.}$$

(5). The interval from maximum redness of the N. equatorial belt to a minimum is a little shorter than the interval from

* Visible at the present time, and also last year.

minimum to maximum. The opposite is the case with regard to the other belt.

Computed times of maxima and minima.

N. Equat. Belt.		S. Equat. Belt.
Maximum	1903·88	Minimum
Minimum	1908·95	Maximum
Maximum	1915·97	Minimum

Addendum.

The reality of these periodical changes of colour will be apparent to anyone who will take the trouble to consult some of the authorities quoted in the last column of the table of the mean redness of the belts. The *coloured* drawings referred to in the following list will, however, show this at a glance. In 1879 the drawings by Professor T. Bredichin published in the *Bulletin de la Société Impériale des Naturalistes de Moscou*, Année 1879, Part 2, p. 370, and in the *Annales de l'Observatoire de Moscou*, vol. vi., p. 95, show the N. equatorial belt ruddy and the S. equatorial belt bluish (or greenish). The drawings by Dr. F. Terby, published in the *Bulletin de l'Académie Royale de Belgique*, 2^{me} série, tome xlix., No. 3, show the N. equatorial belt of a very deep red colour, whilst the S. equatorial belt is colourless. A similar difference in tint is indicated by the photographs of *Jupiter* by Dr. Common, published in the *Observatory* for 1880 February. In these the ruddy N. equatorial belt is very dense and conspicuous, whilst the bluish S. equatorial belt is almost invisible, showing that photographically its light differed materially in intensity from that of the other belt. In 1884 the drawings by Dr. Terby, published in the *Mémoires Cour. et Mém. des Savants Étrangers, publiés par l'Académie Royale de Belgique*, tome xlix., show the S. equatorial belt very red, whilst the N. equatorial belt is colourless. The drawings made by the same observer in 1891 and published in the *Bulletin de l'Académie Royale de Belgique*, 3^{e} série, tome xxii., p. 378, show the N. equatorial belt red, whilst the S. equatorial belt is now again devoid of red colour. Last, but by no means least, the coloured drawings published in Gruithuisen's *Astronomisches Jahrbuch* for the year 1845 (vol. vi.), show a complete half cycle of changes, from a minimum of the N. equatorial belt and maximum of the S. equatorial belt, to a maximum of the N. equatorial belt and a minimum of the S. equatorial belt. There are also numerous other coloured drawings published showing both belts red coloured, and relating to the intermediate stages between the epochs of maxima and minima.

At the present time the belts are in one of these intermediate stages. Both belts are of a moderately deep red colour, and are nearly equally red, though the S. equatorial belt usually appears

distinctly a little redder than the N. equatorial belt. The next epoch of maximum and minimum will occur in 1903, and I venture to predict that in that year the N. equatorial belt will be intensely red, whilst the S. equatorial belt will then appear colourless, or even of a bluish tint.

Photographs of the Radiant of the Leonid Meteors, and Attempts to Photograph the Meteor Stream. By Isaac Roberts, D.Sc., F.R.S.

The part of the sky around the radiant point of the Leonid meteors was closely watched during the night of the 13th and morning of the 14th November last, and during an interval of absence of clouds four photographs were obtained, two with the 20-inch reflector, and two with the 5-inch lens camera.

Clouds overcast the sky until two o'clock on the morning of the 14th, and then clearness set in, which continued till daybreak. During that interval the four photographs were taken—two with simultaneous exposures of two hours, and two with ninety minutes'.

Only two Leonid meteors fell during the three and a half hours' interval, and they did not become luminous within the range of the camera photo-field of $7\frac{1}{2}$ degrees radius from the radiant, and consequently they were not photographed, but their directions with reference to certain stars were determined by sight. No other interval was suitable for photographic work during the passing of the stream.

On examination of the plates two nebulæ were discovered in close proximity to the radiant; and the following are their co-ordinates as deduced from the star *D.M.* No. 2164, zone 22° north, R.A. $9^h\ 54^m\ 44^s{\cdot}4$, Dec. north 22° 39′·7, Epoch 1855. The nebulæ are in the positions R.A. $9^h\ 55^m\ 54^s{\cdot}8$, Dec. north 22° 59′·4, and R.A. $9^h\ 55^m\ 54^s{\cdot}8$, Dec. north 22° 58′·7.

The northernmost nebula is a well-defined star of about 13th magnitude, surrounded by a halo of faint nebulosity; and the other nebula, which is 42 seconds of arc south of it, resembles a star of about 16th magnitude, elongated nearly in *preceding* to *following* direction. These nebulæ are not referred to in the catalogues. I thought it possible that they were connected with the meteor stream, but another photograph taken on December 9 (25 days later) showed no change in their position, and therefore they could not be connected with the meteors.

Attempts to Photograph the Meteor Stream.

The Ephemeris of the denser part of the meteor stream which was prepared, under the directions of Dr. G. Johnstone Stoney and Dr. Downing, by Mr. Wright and other computers at the

office of the *Nautical Almanac*, and published in the *Monthly Notices* of this Society for 1898 November, enabled me to make fair trials in photographing the stream by aid of the 20-inch reflector and the 5-inch lens camera ; and it was reasonable to expect that after the great care which had been taken in the preparation of the Ephemeris some practical results would be obtained.

Watchful vigilance was kept at my observatory for clear intervals in the sky between January 1 and March 10 (last month) ; but the sky had been abnormally covered with clouds and mistiness during the whole of the autumn and winter months. The moonlight also interfered with this kind of photographic work, and it was not till February 16 that the first suitable opportunity occurred to make a photographic trial with an exposure of ninety minutes. The plate when developed showed no indication of the meteors. The second opportunity occurred on March 5, when an exposure of two hours was made, but still there was no indication of the meteors. The third, and last, trial was made on March 10, when an exposure of four hours was obtained ; but still there was no indication of the meteors ; and if light of the feebleness of 17th to 18th magnitude stars had accompanied them, each of the photographs referred to would have shown it, for the conditions were favourable to photograph light up to that limit.

We all regret the absence of success in these experiments ; but they were well worth the trouble and expense incurred in making the several trials during the past three years, and I do not regret having made the attempts.

The next important work that claims our attention in connection with this question is that of photographing the trails of the meteors as they pass through the Earth's atmosphere in November next ; and although moonlight will to a considerable extent interfere, I think it probable that many trails will be bright enough to show through the effects of moonlight on the photographic plates. On this assumption I would offer the following suggestions :—

(1) We should take trial photographs, at favourable opportunities, between now and November, with the instruments and photo-plates we then propose to use.

(2) The photo-plates should be exposed separately in the camera, or telescope, during respective intervals of 5, 10, 15, 20, and 30 minutes, upon any part of the sky, with declination 23 degrees north. These experimental exposures should be made at those times which occur each month when the Moon will be about 135 degrees from the part of the sky here indicated, and when it is eleven days old. These conditions will roughly correspond with the lunar conditions that will prevail on November 14 next.

(3) The experimental plates should be developed till the films show a decided darkening by the effect of the moonlit sky,

and thus we shall be able to determine the equation of the instruments and gain experience for our guidance before the critical time for action arrives. We shall be able to judge beforehand for what length of time we may safely continue the exposures of the plates in the camera during partial moonlight, without risk of spoiling them by over-exposure, and also save trouble and time in changing the plates at unnecessarily short intervals.

Observations of Planet (433) *Eros, and of Comet Tuttle, at the Radcliffe Observatory, Oxford.*

(*Communicated by the Radcliffe Observer.*)

The following observations were made with the 10-inch Barclay Equatorial, using the ring micrometer, with power 100.

Date.	G.M.T.	Local Sidereal Time.	Observer.	Planet or Comet *minus* Star (corrected for Refraction only). R.A.	N.P.D.	No. of Comps.	Apparent R.A. of Planet or Comet.	Parallax in R.A. p.	Log. $(p \times \Delta)$.	Apparent N.P.D. of Planet or Comet.	Parallax in N.P.D. q.	Log $(q \times \Delta)$.	Ref.
				Planet Eros.									
1898.	h m s	h m s		s	′ ″		h m s	s		° ′ ″	″		
Sept. 6	11 1 35	22 0 45	R.	−10·74	+0 11·28	11	20 49 7·18	+0·14	9·0526	96 19 20·1	9·32	0·8713	(*a*)
				Comet Tuttle.									
1899.													
Apr. 10	9 2 48	10 13 14	R.	−51·59	−5 49·25	6	3 32 17·61	+0·22	9·5843	69 18 55·5	3·91	0·8327	(*b*)

Observer's Remarks.

(*a*) Planet faint; estimated magnitude 11·5. Sky hazy.
(*b*) Comet excessively faint; altitude small. Observations very difficult.

Assumed Places of the Comparison Stars.

Ref.	Mean R.A.	Reduction to Appar. R.A.	Mean N.P.D.	Reduction to Appar. N.P.D.	Authority.
	h m s	s	° ′ ″	″	
(*a*)	20 49 13·56	+4·36	96 19 27·25	−18·43	Radcliffe Transit Circle observations, 1898 Sept. 10, 14.
(*b*)	3 33 8·28	+0·92	69 24 49·08	− 4·33	Mean of Berlin B (A.G.) 1084, and Greenwich (1880) 557.

In the computation of the parallaxes the adopted value of the Sun's mean horizontal parallax is 8″·85; and the geocentric distances, Δ, are taken from the *Astronomische Nachrichten*, Nos. 3517 and 3555.

Observer: R., Mr. W. H. Robinson.

Radcliffe Observatory, Oxford:
1899 *April* 13.

Further Observations of Comet Coddington (*c* 1898). By John Tebbutt.

Having now brought my observations of this comet to a close, I herewith, in accordance with my promise, forward to you my second, and last, series of positions. The whole work of the two series embraces 102 nights, from 1898 June 15, to 1899 February 15, 768 comparisons, and 137 comparison stars. The observations made on June 22, 26, 29, July 3, 5, 6, 21, August 19, September 7, 10, 30, October 18, November 2, December 11, January 6, 16, 30, and February 14, 15, were more or less unsatisfactory. The comparisons of September 10 were especially so, for three reasons. The difference of north polar distance of the two objects was so great that they were with difficulty embraced within the square bar-micrometer; secondly, the comet was almost in contact with a 9th magnitude star, and therefore rendered faint; and, thirdly, the second reappearances of the comparison star, and the first disappearances of the comet at the edges of the micrometer bars, were almost simultaneous. On January 16 I could not find the comet as a separate object, but I noticed that a star of the 9th magnitude, close to its ephemeris-position, appeared slightly nebulous as it disappeared and reappeared at the edges of the bars. This star, which is identical with No. 247 of Zone $-50°$ of the *Cape Photographic Durchmusterung*, was therefore observed for the comet. The adopted mean places of the comparison stars are throughout the means, with equal weights, from the catalogues cited. An error, however, exists in the determination of the mean R.A. of Star No. 19 in my former communication. The seconds should be $34^s{\cdot}89$ instead of $34^s{\cdot}78$, and the seconds of the apparent R.A. of the comet for July 5 will accordingly be $20^s{\cdot}02$.

Dates, 1898 and 1899.	Windsor Mean Time.	Comet—Star. Δ R.A.	Comet—Star. Δ N.P.D.	No. of Comps.	Comet's Apparent R.A.	Comet's Apparent N.P.D.	Log. $p\Delta$ for R.A.	Log. $p\Delta$ for N.P.D.	Comp. Star.
	h m s	m s	′ ″		h m s	° ′ ″			
Oct. 31	8 15 48	+5 37·25	+ 1 47·3	4	15 7 23·14	168 47 1·6	0·353	0·625	93
Nov. 2	8 20 16	−3 37·35	+ 4 22·9	2	15 20 25·63	169 42 14·1	0·391	0 616	94
5	8 19 17	+3 25·12	− 6 3·2	5	15 44 38·45	171 2 43·2	0·463	0·562	95
10	7 50 36	−1 34·70	+ 0 51 1	3	16 45 41·36	173 2 36·5	0·607	0·123	96
14	8 53 39	−9 27·57	− 7 3·7	3	18 3 46·52	174 10 32·0	0·684	0·102	97
Dec. 1	8 46 5	−2 40·71	+ 6 5·8	5	23 23 37·80	169 35 55·7	0·146	*n*0·728	98
2	9 7 11	+8 26·14	− 6 26·8	5	23 31 50·90	169 1 31·1	0·173	*n*0·699	99
8	8 56 31	−0 37·16	− 3 13·0	8	0 8 43·30	165 25 29·5	9·979	*n*0·700	100
8	10 11 53	−0 21·63	− 5 15·9	8	0 8 58·83	165 23 26·6	0·161	*n*0·550	100
9	9 2 53	+9 44·66	− 0 36·8	4	0 13 28·13	164 47 37·7	9·980	*n*0·686	101
10	9 22 42	+4 54·07	− 5 28·6	8	0 17 57·55	164 9 2·4	0·018	*n*0·649	102
11	9 33 57	+4 3·18	− 5 17·7	6	0 22 9·93	163 30 21·8	0·029	*n*0·621	103
13	9 17 33	−1 48·30	+ 7 27·2	8	0 29 45·61	162 13 9 8	9·956	*n*0·636	104
29	9 7 21	+1 59·07	+ 4 17·6	6	1 12 10·18	151 37 5·5	9 791	*n*0·460	105
Jan. 1	8 50 5	−0 16·88	− 1 28·5	10	1 18 2·10	149 37 55·7	9·734	*n*0·450	106
2	9 3 20	+3 48·07	+ 1 7·6	6	...	...	9·766	*n*0·396	107
2	9 3 20	+4 6·35	+ 8 17·1	6	...	...	9·766	*n*0·396	108
3	8 51 56	−0 45·86	+10 4·5	6	...	...	9·734	*n*0·408	109
3	8 51 56	−2 24·94	− 0 5·3	6	...	...	9·734	*n*0·408	110
4	9 8 29	−6 50·07	+ 7 22·3	8	1 23 36·90	147 38 41·5	9·772	*n*0·335	111
6	9 5 14	−0 26·38	− 9 28·9	10	1 27 6·91	146 19 58·1	9·759	*n*0·297	112
7	8 57 3	−2 59·45	− 4 40·6	3	1 28 49·34	145 41 8·0	9·738	*n*0·301	113

Dates, 1898 and 1899.	Windsor Mean Time.	Comet—Star. Δ R.A.	Comet—Star. Δ N.P.D.	No. of Comps.	Comet's Apparent R.A.	Comet's Apparent N.P.D.	Log. $p\Delta$ for R.A.	Log. $p\Delta$ for N.P.D.	Comp. Star.
	h m s	m s	′ ″		h m s	° ′ ″			
Jan. 7	8 57 3	−7 10·55	+ 1 9·9	3	1 28 49·58	145 41 4·0	9·738	*n*0·301	114
9	9 24 41	−6 23·79	+ 7 36·8	10	1 32 12·78	144 22 37·0	9·790	*n*0·101	115
12	9 40 7	+3 10·49	+ 5 47·6	7	...	...	9·806	*n*9·773	116
12	9 40 7	−6 16·09	+ 8 11·5	7	1 37 6·33	142 26 42·2	9·806	*n*9·773	117
13	8 51 7	+8 9·21	+11 24·9	2	1 38 37·98	141 49 49·8	9·716	*n*0·140	118
14	9 19 33	+0 26·08	+ 2 5·5	10	1 40 13·85	141 11 12·8	9·769	*n*9·877	119
14	9 19 33	−1 55·50	− 8 14·7	10	1 40 13·92	141 11 11·8	9·769	*n*9·877	120
15	9 31 19	+4 7·20	+ 0 9·6	7	1 41 47·70	140 33 13·2	9·786	*n*9·609	121
15	9 31 19	−1 1·26	− 2 30·6	7	1 41 47·51	140 33 11·5	9·786	*n*9·609	122
15	9 31 19	−5 12·76	− 9 19·3	7	1 41 47·86	140 33 13·1	9·786	*n*9·609	123
16	9 27 35	+2 31·30	− 3 51·5	4	...	...	9·778	*n*9·558	124
30	9 0 17	+1 47·31	− 3 7·6	6	...	...	9·724	9·870	125
Feb. 1	9 11 19	+7 8·66	− 6 32·0	7	2 6 4·71	130 29 23·5	9·738	0·060	126
1	9 11 19	+6 57·91	− 7 23·2	7	2 6 5·08	130 29 22·6	9·738	0·060	127
2	9 10 48	+5 22·86	− 5 10·3	8	2 7 25·59	129 56 11·8	9·737	0·095	128
3	9 6 2	−6 31·68	− 3 12·7	6	2 8 45·89	129 23 25·5	9·731	0·102	129
3	9 6 2	−7 48·41	− 6 27·6	6	2 8 45·56	129 23 23·8	9·731	0·102	130
6	8 58 58	−7 11·84	− 0 38·8	6	2 12 44·54	127 46 48·8	9·722	0·161	131
6	8 58 58	−7 32·63	− 2 24·7	6	2 12 44·90	127 46 46·2	9·722	0·161	132
9	8 49 9	−4 6·46	− 7 51·1	7	2 16 40·05	126 12 40·9	9·711	0·200	133
10	8 38 32	+1 42·14	+ 7 28·6	10	2 17 56·73	125 42 4·3	9·698	0·180	134
13	9 33 38	−1 53·39	− 5 34·6	4	2 21 52·66	124 10 22·2	9·750	0·431	135
14	8 36 26	−2 52·27	+ 8 5·3	8	2 23 6·32	123 41 38·8	9·698	0·269	136
15	8 27 54	−3 31·78	+ 9 26·8	3	2 24 22·34	123 12 42·6	9·688	0·260	137

Mean Places of the Comparison Stars for the Beginning of the Year of Observation.

Comp. Star.	Mean R.A.	Red. to App. R.A.	Mean N.P.D.	Red. to App. N.P.D.	Authorities.
	h m s	s	° ′ ″	″	
93	15 1 44·04	+1·85	168 44 56·4	+17·9	Argent. Gen. Cat. 20477; Stone, 8214.
94	15 24 0·57	+2·41	169 37 33·5	+17·7	Gilliss' Cat. 1850, 10985.
95	15 41 10·48	+2·85	171 8 29·3	+17·1	Gilliss' Cat. 1850, 11203.
96	16 47 10·75	+5·31	173 1 29·9	+15·5	Gilliss' Cat. 1850, 12063.
97	18 13 5·03	+9·06	174 17 23·5	+12·2	Gilliss' Cat. 1850, 13100.
98	23 26 11·59	+6·92	169 29 55·2	− 5·3	Gilliss' Cat. 1850, 16397.
99	23 23 18·03	+6·73	169 8 3·1	− 5·2	Gilliss' Cat. 1850, 16376.
100	0 9 15·18	+5·28	165 28 49·2	− 6·7	Argent Gen. Cat. 139; Stone, 68.
101	0 3 38·30	+5·17	164 48 21·1	− 6·6	Argent. Gen. Cat. 45; Stone, 22.
102	0 12 58·47	+5·01	164 14 37·8	− 6·8	Gilliss' Cat. 1850, 104.
103	0 18 1·87	+4·88	163 35 46·4	− 6·9	Gilliss' Cat. 1850, 164.
104	0 31 29·30	+4·61	162 5 49·8	− 7·2	Argent. Gen. Cat. 534.
105	1 10 7·37	+3·74	151 32 55·6	− 7·7	Argent. Gen. Cat. 1170; Stone, 480; suspected double.
106	1 18 17·63	+1·35	149 39 13·0	+11·2	Argent. Gen. Cat. 1312; Stone, 534.
107	1 16 7	+1·29	148 56	+11·2	Equatorial. 9½ mag.
108	1 15 49	+1·29	148 49	+11·1	Equatorial. 9½ mag.
109	1 22 29	+1·31	148 8	+11·0	Equatorial. 9½ mag.
110	1 24 8	+1·32	148 18	+11·1	Equatorial. 9½ mag.
111	1 30 25·64	+1·33	147 31 8·2	+11·0	Argent. Gen. Cat. 1536; Stone, 627.
112	1 27 32·05	+1·24	146 29 16·1	+10·9	Argent. Gen. Cat. 1479.
113	1 31 47·55	+1·24	145 45 37·8	+10·8	Argent. Gen. Cat. 1559; Stone, 637.
114	1 35 58·85	+1·28	145 39 43·3	+10·8	Argent. Gen. Cat. 1635; Stone, 669.
115	1 38 35·34	+1·23	144 14 49·6	+10·6	Argent. Gen. Cat. 1681; Stone, 683.
116	1 33 55	+1·12	142 21	+10·3	Equatorial. 8¾ mag.
117	1 43 21·24	+1·18	142 18 20·3	+10·4	Argent. Gen. Cat. 1759; Stone, 711.
118	1 30 27·70	+1·07	141 38 14·7	+10·2	Argent. Gen. Cat. 1534.
119	1 39 46·66	+1·11	141 8 57·1	+10·2	Argent. Gen. Cat. 1696; Stone, 686.
120	1 42 8·30	+1·12	141 19 16·3	+10·2	Argent. Gen. Cat. 1733; Stone, 702.

Comp. Star.	Mean R.A.	Red. to App. R.A.	Mean N.P.D.	Red. to App. N.P.D.	Authorities.
	h m s	s	° ′ ″	″	
121	1 37 39·43	+1·07	140 32 53·5	+10·1	Argent. Gen. Cat. 1665; Stone, 677.
122	1 42 47·67	+1·10	140 35 32·0	+10·1	Argent. Gen. Cat. 1746.
123	1 46 59·49	+1·13	140 42 22·2	+10·2	Argent. Gen. Cat. 1816; Stone, 738.
124	1 40 45	+1·07	140 0	+10·0	Equatorial. 9 mag. = Cape Phot. Durch. −50°.239.
125	2 1 34	+0·93	131 39	+ 8·7	Equatorial. 8½ mag. = Cape Phot. Durch. −41°.192.
126	1 58 55·17	+0·88	130 35 47·2	+ 8·3	Argent. Gen. Cat. 2046.
127	1 59 6·29	+0·88	130 36 37·5	+ 8·3	Argent. Gen. Cat. 2053.
128	2 2 1·85	+0·88	130 1 13·8	+ 8·3	Argent. Gen. Cat. 2110; Stone, 835.
129	2 15 16·63	+0·94	129 26 29·7	+ 8·5	Argent. Gen. Cat. 2377; Stone, 926.
130	2 16 33·02	+0·95	129 29 42·9	+ 8·5	Argent. Gen. Cat. 2406.
131	2 19 55·46	+0·92	127 47 19·4	+ 8·2	Argent. Gen. Cat. 2485.
132	2 20 16·61	+0·92	127 49 2·7	+ 8·2	Argent. Gen. Cat. 2489; Stone, 959.
133	2 20 45·63	+0·88	126 20 24·2	+ 7·8	Argent. Gen. Cat. 2506.
134	2 16 13·74	+0·85	125 34 28·2	+ 7·5	Argent. Gen. Cat. 2399.
135	2 23 45·21	+0·84	124 15 49·5	+ 7·3	Argent. Gen. Cat. 2565; Stone, 981; Radcliffe, 1890, 577.
136	2 25 57·75	+0·84	123 33 26·3	+ 7·2	Argent. Gen. Cat. 2617; Stone, 999.
137	2 27 53·28	+0·84	123 3 8·7	+ 7·1	Yarnall$_3$ 1165; Argent. Gen. Cat. 2657.

Observatory: Peninsula, Windsor, New South Wales, 1899 *Feb.* 27.

Observation of Tuttle's Comet (b 1899*) made with the* 30*-inch Reflector of the Thompson Equatorial at the Royal Observatory, Greenwich.*

(*Communicated by the Astronomer Royal.*)

On March 14 a photograph of *Tuttle's* Periodical Comet was obtained with the 30-inch reflector, with exposures of 10^m and 6^m. The positions of the comet and of eight comparison stars, as shown by the 10^m exposure, were measured, and the following place of the comet was obtained :—

Date.	G.M.T.	Apparent R.A.	Apparent Decl.	Log Δ.	Corr. for Parallax R.A.	Corr. for Parallax Decl.
	d h m s	h m s	° ′ ″		s	″
Mar.	14 7 37 17	1 50 19·23	+29 31 41·4	0·2480	+0·24	+3·1

Observations of Planet Eros from Photographs taken with the 30-inch Reflector of the Thompson Equatorial at the Royal Observatory, Greenwich.

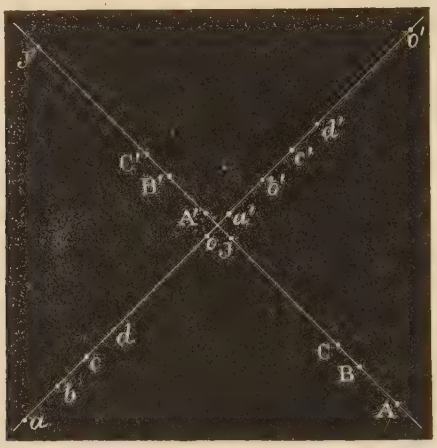
(*Communicated by the Astronomer Royal.*)

Photographs of planet *Eros*, on which the position of the planet is shown with sufficient distinctness for accurate measurement, have been obtained with the 30-inch reflector on twenty-four nights between 1898 September 20 and 1899 March 31. Ilford "special rapid" plates were used, and the exposure usually given was five or six minutes. On twelve nights two exposures were made on the same plate, and on six nights two separate plates were obtained. On two nights (February 28 and March 14) short exposures of 40 seconds were also given, in order to obtain smaller images of the "reference stars" for use in determining the plate constants. In the later photographs the electric hand control was used to correct the large motion of the planet in right ascension, as the trail of the planet was too faint to be distinctly measurable when the equatorial was driven at a sidereal rate.

Réseaux have been printed on all the photographs except those taken on September 20, 21, 23, and October 3, and rectangular coordinates of the planet and of the reference stars have been measured in exactly the same way as for the astrographic photographs. The positions of the reference stars have been derived when possible from the catalogues of the *Astronomische Gesellschaft*, those between 5° and 15° N. having been kindly supplied in manuscript by Dr. Bruns, the Director of the Leipzig Observatory, and those south of the Equator from the Ottakring Zone Observations for *A.G.C.*, the Karlsruhe Observations, the Radcliffe Catalogue, 1890, and Schjellerup's Catalogue for 1865.

The images of the stars at some distance from the centre of the field show considerable *coma* away from the centre. This introduces some uncertainty as to the position of the optical centre of the images, and it was therefore necessary to examine the distortion of the field. For this purpose a plate was exposed four times on the *Pleiades* showing two lines of stars in the directions of the diagonals with displacement between, so that a star at the corner of the plate for one exposure was brought to the centre of the plate for another, and conversely, as indicated in the diagram, and the distances between the two images of a number of stars nearly in the same straight line were measured. These measures showed that, though there might be a distortion amounting to 2″ at a distance of 1° from the centre, the different magnitudes of the stars and consequent difference in the

images made it impracticable to obtain a trustworthy correction to the measures depending on the distance from the centre of the plate.



The coordinates of the reference stars were measured in two positions of the plate (in the second position turned in its own plane through 180°), and where there were two exposures the two images were measured by separate measurers and the mean taken. The planet's image or images were measured twice, in direct and reversed positions of the plate.

The measured coordinates of the reference stars were compared with the standard coordinates derived from their right ascensions and declinations, and linear corrections

$$ax + by + c \text{ and } dx + ey + f$$

were obtained to the measured coordinates. These corrections were applied to the measured coordinates of the planet, and its apparent right ascension and declination deduced. The constants c and f are arbitrary, depending on the assumed right ascension and declination of the centre of the plate in the computation of the standard coordinates; but a and e, when corrected for differential refraction and aberration, give the *scale* value, while d and e, similarly corrected, give the orientation.

The values of the correction to the scale (assumed to be 1^{mm} to $1'$) as derived from the separate determinations of a and e for each plate, and the corrections for orientation of each plate expressed in circular measure ($=-b=d$) are given in Table I.

The mean of thirty-two determinations from a gives ·01109 as the correction to the assumed scale, while the mean of the thirty-two determinations from e gives ·01117. The resulting

focal length is $(1 + \cdot0111)^{mm} \times \text{cosec } 1'$, that is $3^m \cdot 4760$, or 11 feet 4·85 inches. The scale is almost exactly $\frac{1}{90}$th larger than the scale of 1^{mm} to $1'$ adopted for the Astrographic Chart.

The discordances between the two determinations of scale value and of orientation from the measures in the two directions x and y are exhibited in the fourth and seventh columns of Table I. The mean values of these discordances are $\pm \cdot00028$ and $\pm \cdot00039$ $(= \pm 1'\cdot3)$. The large values of the discordances in the orientation as determined from the measures in the two directions shown on the plates taken on September 20, 21, 23, and October 3, is probably due to the fact that no *réseau* was printed on these plates, and their measurement was consequently more difficult.

On February 28 and March 14, in addition to exposures of five and six minutes, which showed the planet, an additional short exposure of forty seconds was also given. The plate constants were determined separately for the long and short exposures, and the differences of the coordinates of a number of stars near the centre of the plate were also measured. Thus a comparison was obtainable between the plate constants determined in the two ways. The following table shows satisfactory accordance between the results :—

	$a-a'$	$b-b'$	$c-c'$	$d-d'$	$e-e'$	$f-f'$
			″			″
Feb. 28	$-\cdot00024$	$-\cdot00015$	$+\cdot03$	$-\cdot00009$	$-\cdot00034$	$+\cdot27$
Mar. 14	$-\cdot00003$	$-\cdot00004$	$-\cdot18$	$-\cdot00012$	$-\cdot00015$	$+\cdot09$

Table II. gives the lengths of the exposures on the different nights, the number of reference stars used, the mean discordances of the measured coordinates corrected linearly, and the "standard coordinates" derived from the tabular places of these stars. In addition the approximate coordinates of the planet and of the mean of the reference stars are also given.

Comparison of columns 3 and 4 with 5 and 6 shows that the position of the planet on the plate is never far from the mean of the stars. Any errors in the scale and orientation will only have a small effect on the determination of the "standard coordinates" (and therefore of the deduced right ascension and declination) of the planet.

The mean values of the discordances shown in columns 8 and 9 of Table II. are $\pm^s \cdot061$ and $\pm 0''\cdot76$. These represent the combined effect of errors in the measures (including distortion) and in the tabular places of the stars. As the average number of reference stars is 16 per plate, and the planet is near their mean position, the probable error of its position arising from these causes is $\pm^s \cdot013$ and $\pm''\cdot16$.

TABLE I.

Plate Constants.

Date.	Correction to Scale Value. a	e	$a-e$ (in units of fifth decimal place)	Correction for Orientation. b	d	$b+d$ (in units of fifth decimal place)
1898.						
Sept. 20	−·01048	−·01099	+51	+·00931	−·00801	+130
21	−·01106	−·01120	+14	+·00055	+·00063	+118
23	−·01103	−·01124	+22	−·00260	+·00391	+131
Oct. 3	−·01099	−·01120	+21	−·00087	+·00207	+120
Nov. 3	−·01122	−·01063	−59	−·01117	+·01061	−56
Dec. 7	−·01080	−·01113	+33	−·01426	+·01369	−57
9	−·01072	−·01112	+40	−·01107	+·01083	−24
1899.						
Jan. 10	−·01123	−·01139	+16	−·01444	+·01438	−6
25	−·01166	−·01098	−68	−·01595	+·01606	+11
26	−·01060	−·01083	+23	−·01498	+·01498	0
27	−·01140	−·01142	+2	−·01469	+·01415	−54
Feb. 2	−·01102	−·01144	+42	−·01279	+·01233	−46
22	−·01137	−·01128	−9	−·00842	+·00858	+16
22	−·01152	−·01156	+4	−·01396	+·01408	+12
24	−·01105	−·01102	−3	−·01374	+·01351	−23
24	−·01120	−·01095	−25	−·01436	+·01437	+1
25	−·01129	−·01107	−22	−·01519	+·01500	−19
27	−·01116	−·01126	+10	−·01602	+·01675	+73
27	−·01118	−·01122	+4	−·01448	+·01483	+35
28	−·01142	−·01159	+17	−·01588	+·01533	−55
28	−·01118	−·01125	+7	−·01573	+·01542	−31
Mar. 5	−·01157	−·01110	−47	−·01165	+·01143	−22
5	−·01148	−·01121	−27	−·01435	+·01420	−15
9	−·01096	−·01152	+56	−·01833	+·01848	+15
11	−·01062	−·01134	+72	−·01565	+·01619	+54
14	−·01066	−·01112	+46	−·01564	+·01591	+27
14	−·01064	−·01098	+34	−·01560	+·01603	+43
24	−·01077	−·01098	+21	−·02005	+·01999	−6
24	−·01085	−·01095	+10	−·01292	+·01277	−15
27	−·01118	−·01093	−25	−·01493	+·01492	−1
27	−·01126	−·01108	−18	−·01647	+·01664	+17
31	−·01128	−·01093	−35	−·01560	+·01564	+4
Mean	−·01109	−·01115	±28	...	...	±39

TABLE II.

Date.	Exposure.	Approx. Coords. of Planet. R.A.	Decl.	Approx. Coords. of Mean of Reference Stars. R.A.	Decl.	No. of Stars.	Mean discordance of tabular and measured Coords. R.A.	Decl.
1898.							s	″
Sept. 20	20m	− 0·1	− 1·3	−11·0	+ 0·2	14	± ·046	± 0·51
21	20m	− 2·0	+ 3·5	− 8·5	+ 4·0	15	± ·060	± 0·66
23	15m	− 0·4	− 2·1	0·0	− 1·4	16	± ·044	± 0·60
Oct. 3	10m & 5m	+ 4·5	− 2·0	+10·5	+ 0·3	16	± ·044	± 0·66
Nov. 3	20m	+19·7	+ 2·3	− 4·2	−12·2	7	± ·038	± 0·51
Dec. 7	5m & 7m	− 7·5	− 1·5	+ 4·0	−12·5	8	± ·044	± 0·57
9	5m & 6m	− 7·8	−15·2	+ 0·6	−14·3	10	± ·054	± 0·90
1899.								
Jan. 10	5m & 4m	− 3·6	+ 1·2	− 0·4	+ 1·4	22	± ·050	± 0·66
25	4m & 6m	− 3·8	+ 3·2	−20·3	0·0	13	± ·101	± 0·75
26	4m & 6m	− 4·1	+ 2·2	+ 4·2	+ 1·6	15	± ·062	± 0·63
27	4m & 6m	− 7·5	+ 0·6	+ 2·3	+13·4	14	± ·067	± 0·51
Feb. 2	4m & 6m	−10·6	+ 3·0	−13·4	+ 2·0	18	± ·051	± 0·69
22	5m	− 5·3	+ 4·5	+ 1·5	+ 2·4	15	± ·097	± 0·84
22	5m	− 7·0	+ 2·5	− 0·6	+ 0·3	15	± ·072	± 0·87
24	4m	− 2·4	+ 2·0	− 1·9	− 8·4	22	± ·079	± 0·54
24	4½m	− 2·5	+ 3·2	− 1·2	−10·9	21	± ·062	± 0·69
25	5m	− 3·8	+ 4·3	+ 6·6	− 9·6	23	± ·087	± 0·81
27	5m	− 5·4	+ 2·7	+ 3·0	+ 6·7	14	± ·087	± 1·17
27	6m	+ 1·8	+ 3·8	+ 7·7	− 0·6	14	± ·068	± 0·81
28	6m & 5m	− 3·3	+ 1·6	+ 1·7	+ 4·8	14	± ·075	± 1·17
28	40s	...	...	+ 1·4	+ 3·7	14	± ·068	± 0·81
Mar. 5	5m	+ 2·7	+ 1·2	+ 0·2	− 8·3	19	± ·065	± 1·26
5	6m	+ 2·7	+ 1·9	− 0·1	− 7·6	19	± ·067	± 1·35
9	6m & 5m	+ 0·9	− 6·4	− 3·2	+22·4	9	± ·078	± 0·75
11	6m & 5m	− 7·6	− 9·4	+ 0·5	− 4·4	11	± ·053	± 0·42
14	5m & 4m	+ 1·4	+ 1·9	+13·2	+ 5·4	17	± ·058	± 0·87
14	40s	...	...	+13·2	+ 4·4	17	± ·058	± 1·08
24	5m	+ 3·2	+ 3·4	+ 5·3	−17·5	18	± ·056	± 0·51
24	5m	+ 1·3	+ 2·5	+ 5·6	−16·4	17	± ·036	± 0·57
27	5m	− 4·8	+ 3·1	+ 6·2	+ 4·1	21	± ·038	± 0·78
27	6m	− 8·5	+ 1·0	+ 2·0	+ 2·0	21	± ·056	± 0·81
31	6m	− 8·8	+ 2·5	+ 4·0	+ 4·8	16	± ·041	± 0·66
					Mean		± ·061	± 0·76

The right ascensions and declinations of the planet and the mean times of observation are given in Table III.

TABLE III.

Date.	G.M.T.	Apparent R.A.	Apparent Decl.	Log. Δ.	Corr. for Parx. R.A.	Corr. for Parx. Decl.
	h m s	h m s	° ′ ″		s	″
Sept. 20	9 20 6	20 37 32·39	− 6 21 20·8	9·9400	+0·08	+8·6
21	8 39 17	20 37 7·68	− 6 21 12·3	9·9430	+0·01	+8·5
23	7 49 1	20 36 26·32	− 6 20 43·7	9·9492	−0·07	+8·4
Oct. 3	7 58 14	20 35 59·57	− 6 13 59·5	9·9811	+0·02	+7·8
Nov. 3	8 15 36	21 1 4·39	− 4 47 51·2	0·0747	+0·16	+6·1
Dec. 7	6 39 44	21 58 19·74	− 0 49 25·7	0·1429	+0·12	+5·0
9	5 24 41	22 2 15·07	− 0 30 56·4	0·1464	+0·04	+5·0
Jan. 10	6 11 27	23 14 30·46	+ 5 39 3·0	0·1890	+0·14	+4·2
25	6 19 43	23 53 9·29	+ 9 5 51·6	0·2015	+0·15	+3·9
26	6 5 49	23 55 49·01	+ 9 19 57·6	0·2021	+0·15	+3·8
27	6 22 33	23 58 33·08	+ 9 34 25·6	0·2029	+0·16	+3·8
Feb. 2	6 9 36	0 15 2·42	+11 0 43·9	0·2066	+0·15	+3·7
22	7 0 19	1 14 18·37	+15 49 2·4	0·2152	+0·20	+3·6
22	7 13 28	1 14 20·10	+15 49 9·5	0·2152	+0·21	+3·6
24	6 51 8	1 20 34·05	+16 16 46·8	0·2158	+0·20	+3·5
24	7 4 51	1 20 35·87	+16 16 53·7	0·2158	+0·20	+3·6
25	7 38 59	1 23 50·45	+16 31 1·2	0·2161	+0·22	+3·7
27	8 3 29	1 30 17·37	+16 58 34·6	0·2166	+0·23	+3·8
27	8 16 2	1 30 18·75	+16 58 39·9	0·2166	+0·23	+3·8
28	7 5 49	1 33 22·61	+17 11 32·2	0·2168	+0·21	+3·5
28	7 5 49	1 33 22·61	+17 11 31·9	0·2168	+0·21	+3·5
Mar. 5	7 33 8	1 49 48·90	+18 17 41·4	0·2179	+0·22	+3·6
5	7 44 34	1 49 50·47	+18 17 47·2	0·2179	+0·22	+3·6
9	7 12 14	2 3 11·73	+19 7 54·0	0·2188	+0·21	+3·5
11	7 16 32	2 10 1·79	+19 32 13·4	0·2192	+0·22	+3·5
14	7 20 22	2 20 24·73	+20 7 24·9	0·2197	+0·22	+3·5
14	7 20 22	2 20 24·75	+20 7 24·7	0·2197	+0·22	+3·5
24	7 37 43	2 56 11·46	+21 51 42·1	0·2213	+0·23	+3·5
24	7 48 39	2 56 13·03	+21 51 46·3	0·2213	+0·23	+3·5
27	7 34 36	3 7 14·07	+22 18 23·8	0·2217	+0·23	+3·4
27	7 48 9	3 7 16·37	+22 18 27·4	0·2217	+0·23	+3·5
31	7 48 35	3 22 13·88	+22 50 19·9	0·2222	+0·23	+3·5

Indications of the accuracy of the above results may be obtained as follows :—

(i.) The observations from September 20 to December 9 have been given in the November, December and January numbers of the *Monthly Notices*. The results there given were obtained from an entirely different series of measures from those used in the present determination ; in the earlier measures the point considered as the centre of an image of a star at some distance from the centre of the field was taken systematically nearer the *coma* than in the present measures. The differences between the two methods of measurement give the following differences of right ascension and declination :—

Date.	R.A.	Decl.
	s	"
1898 Sept. 20	−·04	−0·3
21	+·04	−0·2
23	+·01	+0·3
Oct. 3	+·12	−0·2
Nov. 3	+·14	+0·1
Dec. 7	−·01	−0·1
9	+·01	+1·1

(ii.) The differences between the positions obtained from two plates taken on the same night when correction is made for the movement of the planet in the interval are

Date.	R.A.	Decl.
	s	"
1899 Feb. 22	+·09	−0·3
24	+·02	−0 8
27	−·24	−1·5
Mar. 5	+·03	−0·3
24	−·09	0·0
27	(+·53)*	−0·6

(iii.) When the plate constants are determined from the subsidiary short exposure, and from the differences of the coordinates of the images of a number of stars near the centre, the differences between the determinations of the right ascensions and declination of the planet are

Date.	R.A.	Decl.
	s	"
1899 Feb. 28	0·00	−0·3
Mar. 14	+0·02	−0·2

In addition to the errors which would be shown in these comparisons, there may be systematic errors of the catalogues employed. No investigation has been made of these and no corrections have been applied ; but in most cases these are probably small.

* The image of the planet was very faint on the second plate taken on March 27.

Results of Micrometer Measures of Double Stars made with the 28-inch Refractor at the Royal Observatory, Greenwich, in the years 1896, 1897, *and* 1898.

(*Communicated by the Astronomer Royal.*)

The measures were made with a bifilar position-micrometer on the 28-inch refractor, aperture 28 inches, focal length 28 feet. The power generally used was 670, but when the definition permitted a power of 1030 was used for observing very close pairs. A blue glass shade was employed to diminish the light and irradiation when bright stars were observed. The observations were made in variously coloured fields or in a dark field with illuminated wires. The initials in the last column are those of the observers, viz. :—

D.	Mr. Dyson.	C.	Mr. Cowell.
L.	„ Lewis.	B.	„ Bryant.
W.B.	„ Bowyer.	D.E.	„ Edney.
P.M.	„ Melotte.	N.	„ Niblett.

Micrometric Observations of Double Stars.

Star's Name.	R.A. 1900.	N.P.D. 1900.	Position Angle.	Distance.	No. of Nights.	Mags.	Epoch 1890+	Obs.
	h m	° ′	°	″				
Σ 3062 ...	0 1	32 10	339·2	1·42	1	6·9 8·0	8·978	B.
β 1014 ...	0 2	58 53	304·1	1·15	3	7·0 12·5	7·937	L.
β 255 ...	0 6	62 10	107·5	0·44	1	7·5 8·4	6·827	L.
			91·7	0·53	3	...	7 885	W.B.
			99·3	0·45	3	...	7·885	L.
OΣ 2 A.B.	0 8	63 35	41·4	0·77	1	6·5 8·0	6·805	W.B.
			36·6	0·52	2	...	6·816	L.
			34·4	0·64	3	...	7·844	W.B.
			33·5	0·47	2	...	7·896	L.
			36·9	0·56	2	...	8·877	L.
			34·6	0·69	3	...	8·908	W.B.
h 1007 (OΣ A.C.)	0 8	63 35	227·2	17·82	1	6·5 9·6	7·898	W.B.
			226·8	17·62	1	...	7·909	L.
			225·7	17 42	1	...	8·778	W.B.
			225·8	17·91	1	...	8·868	L.
OΣ 4 ...	0 10	54 8	146·0	0·48	1	7·5 8·0	7·953	L.
			146·9	0·48	1	...	8·950	W.B.
β 1093 ...	0 15	79 46	39·8	0·31	1	7·3 8·2	6·927	L.
			49·2	0·50	1	...	7·958	L.
			60·9	0·39	1	...	8·885	L.

Star's Name.	R.A. 1900. h m	N.P.D. 1900. ° ′	Position Angle. °	Distance. ″	No. of Nights.	Mags.	Epoch 1890+	Obs.
β 1015 ...	0 15	78 16	116·4	0·40	1	8·4 8·6	7·860	W.B.
			112·6	0·46	1	...	7·936	L.
			124·0	0·48	3	...	8·864	W.B.
			118·1	0·51	1	...	8·890	L.
β 865 ...	0 38	47 20	192·0	1·48	1	8·3 8·8	8·950	W.B.
*	0 41	57 24	12·9	0·53	1	...	7·813	W.B.
Σ 60 (η Cass.)	0 42	32 44	215·3	5·04	1	4·0 7·6	8·104	B.
β 495 ...	0 43	71 52	222·2	0·57	1	7·5 7·7	6·805	W.B.
			221·3	0·81	1	...	6·955	L.
			218·8	0·68	1	...	7·827	W.B.
			219·7	0·62	2	...	7·874	L.
			220·3	0·85	3	...	8·817	W.B.
OΣ 20 (66 Pisc.)	0 49	71 21	332·8	0·40	1	6·0 6·4	6·934	L.
			325·5	0·51	1	...	7·860	W.B.
			330·2	0·42	3	...	7·885	L.
			327·6	0·60	1	...	8·890	L.
			322·0	0·50	2	...	8·949	W.B.
Σ 73 (36 Androm.)	0 50	66 55	13·0	1·17	3	6·2 6·8	6·839	W.B.
			14·1	1·28	1	...	6·857	D.
			16·2	0·92	2	...	7·863	W.B.
			17·8	1·12	2	...	7·896	L.
			16·4	1·04	2	...	8·794	W.B.
β 1228 ...	1 0	77 16	266·8	0·69	1	8·3 8·9	7·865	L.
			265·2	0·86	1	...	7·980	W.B.
			275·7	0·89	3	...	8·868	W.B.
β 303 ...	1 4	66 45	284·3	0·70	1	7·2 7·2	6·857	D.
			280·1	0·64	3	...	7·882	W.B.
			286·2	0·49	2	...	7·896	L.
			281·3	0·50	1	...	8·890	L.
			280·9	0·64	3	...	8·923	W.B.
Σ 113 (42 Ceti)	1 15	91 2	353·2	1·35	2	6·2 7·2	6 885	D.
			349·7	1·54	2	...	8·982	B.
β 506 (η Pisc.)	1 26	75 10	14·1	1·16	1	4·0 10·5	7·986	L.
β 999 A.B.	1 22	45 9	123·3	1·59	1	4·8 11·5	8·868	L.
C.D.	...	...	136·8	5·32	1	10·5 10·5	8·868	L.
β 507 ..	1 30	63 45	153·5	2·20	1	8·0 11·0	7·813	W.B.
			158·6	1·75	1	...	7·972	B.
			158·3	2·24	1	...	7 975	L.
... ...	...	...	158·9	1·56	1	...	8·868	L.

Star's Name.	R.A. 1900.	N.P.D. 1900	Position Angle.	Distance.	No. of Nights.	Mags.	Epoch 1890+	Obs.
	h m	° ′	°	′				
Σ 138 ...	1 31	82 55	36·5	1·67	1	7·3 7·3	6·958	W.B.
			35·0	1·39	1	...	7·879	W.B.
			40·3	1·72	1	...	7·975	B.
			34·5	1·54	3	...	8·934	B.
Σ 157 A.C.	1 40	51 36	116·2	12·48	1	8·5 8·7	8·868	L.
Σ 158 ...	1 41	57 21	258·0	2·04	2	8·3 8·8	6·865	W.B.
			253·9	2·09	1	...	7·813	W.B.
			257·6	2·00	1	...	7·958	L.
			257·1	2·09	1	...	8·931	W.B.
			260·1	2·14	1	...	8·994	B.
β 1016 ...	1 43	57 27	22·6	0·47	1	8·7 8·7	7 860	W.B.
			22 5	0·46	2	...	7·947	L.
			28·3	0·60	1	...	8·931	W.B.
Hough. 311	1 45	66 0	184·2	0·42	1	7·5 7·5	7·827	W.B.
			184·7	0·49	1	...	8·843	W.B.
Σ 180 (γ Arietis)	1 48	71 12	360·2	8·38	1	4·2 4·4	6·882	L.
			358·3	8·32	1	...	7·865	L.
β 512 ...	1 48	71 13	17·2	1·84	1	8·6 11·7	7·865	L.
✶	1 49	71 17	65·7	6·13	1	9 10	7·865	L.
Σ 183 A.B.	1 49	61 46	360·3	...	1	7·5 8·2	6·931	W.B.
			362·6	0·49	1	...	7·827	W.B.
			358·8	0·47	1	...	7·882	L.
			364·5	0·56	3	...	8·914	W.B.
A.C.	...	...	161·7	5·63	1	7·5 8·7	7·827	W.B.
			167·9	5·24	1	...	7·882	L.
			163·8	5·57	3	...	8·914	W.B.
Σ 205 (γ^1 Androm.)	1 58	48 9	64·9	10·15	1	3·0 5·0	6·093	L.
			65·4	10·30	1	...	8·868	L.
OΣ 38 (γ^2 Androm.)	1 58	48 9	311·9	0·17	1	5·0 6·2	6·093	L.
			120·1	0·45	1	...	8·868	L.
Σ 208 (10 Arietis)	1 58	64 33	61·6	0·77	2	6·2 8·4	7·898	W.B.
			60·5	0·83	1	...	8 025	L.
			64·8	0·87	1	...	8·967	W.B.
			60·3	0·74	1	...	8·970	B.
Σ 228 ...	2 8	43 1	66·9	0·27	1	6·7 7·6	6·093	L.
OΣ 43 ...	2 35	63 49	224·5	0·87	1	8·5 9·5	6·099	L.
✶	2 36	63 28	309·8	0·21	1	8·5 9·5	6·099	L.
			319·7	...	1	...	6·099	D.

Star's Name.	R.A. 1900.	N.P.D. 1900.	Position Angle.	Distance	No. of Nights.	Mags.	Epoch 1890+	Obs.
	h m	° ′	°	″				
OΣ 44 ...	2 36	47 43	55·3	1·40	1	8 9	8·131	W.B.
			57·0	1·30	1	...	8·964	L.
β 262 ...	2 42	59 22	245·6	1·35	1	8·2 9·6	6·846	W.B.
			242·3	1·50	4	...	7·890	W.B.
			247·2	...	1	...	8·976	W.B.
Σ 305 ...	2 42	71 2	315·9	2·90	1	7·3 8·0	6·016	L.
			317 2	3·10	2	...	6·867	W.B.
			316·3	2·92	3	...	7·950	W.B.
			316 2	3·01	1	...	7 975	L.
			317·2	3·02	1	...	8·107	L.
			314·7	2·78	1	...	8·947	W.B.
			319·2	3·07	1	...	8·994	B.
β 524 A.B.	2 46	52 5	190·2	0·22	1	5·5 6·5	6·090	L.
Σ 318 A.C.	...	...	237 4	13·92	1	5·5 9·5	6·090	L.
β 525 ...	2 53	68 47	134·4	0·33	3	7·5 7·5	6·658	L.
			132·6	0·29	4	...	7·908	L.
			127·3	0·30	3	...	8·103	L.
			131·0	0·40	1	...	8·953	B.
Σ 333 (ε Arietis)	2 53	69 4	202·1	1·34	1	5·7 6·0	6·077	L.
			200·6	1·33	1	...	8·868	L.
			203 8	1·22	3	...	8·928	B.
			202·3	1·16	1	...	8·931	W.B.
β 1030 ...	3 4	68 40	161·7	0·48	2	8·5 8·5	6·517	L.
			162·6	0·53	2	...	7·896	L.
			159·9	0·42	1	...	8·107	L.
			154·2	0·48	1	...	8·121	W.B.
			161·7	0·53	1	...	8·953	B.
β 530 ...	3 9	67 27	197 0	1·84	1	9·7 10·1	6·934	L.
			...	1·68	1	...	6·847	W.B.
			193·3	2·23	1	...	8·107	L.
β 84 ...	3 11	96 18	17·8	0 57	1	6·8 7·3	8·025	B.
β 878 ...	3 22	67 32	74·1	1·05	1	5·8 13·7	7·882	L
Σ 412 A.B.	3 29	65 52	19·9	0·32	3	6·6 6·9	6·405	L
			12·8	0·33	3	...	7·892	L.
A.C.	3 29	65 52	61·0	22 21	1	6·6 9·0	7·882	L.
β 533 ...	3 29	58 39	46 4	0·49	1	8·0 8·0	7·860	L.
			49·7	0·54	1	...	8·121	W.B.
			51·8	0·62	1	...	8·964	L.
			53 0	0·51	1	...	8·969	B.

Star's Name.	R.A. 1900. h m	N.P.D. 1900. ° ′	Position Angle. °	Distance. ″	No. of Nights.	Mags.	Epoch 1890+	Obs.
Σ 880 ...	3 38	58 9	349·2	0·40	1	8·4 8·4	8·121	W.B.
			346·9	0·42	1	...	8·969	L.
β 1184 ...	3 42	67 56	93·8	0·59	1	8·0 8·5	7·865	L.
			84·7	0·48	2	...	7·924	W.B.
			95·2	0·62	1	...	8·121	W.B.
OΣ 65 ...	3 44	64 43	203·3	0·57	1	5·5 6·5	6·099	L.
Σ 483 ...	3 57	50 40	322·7	0·49	1	8·0 9·5	6·099	L.
			303·0	...	1	...	8·104	B.
			306·7	0·63	2	...	8·964	L.
OΣ 531 ...	4 1	52 11	132·5	2·14	1	8·5 10·2	6·849	W.B.
			127·8	1·89	1	...	7·936	L.
			126·9	1·92	2	...	7·945	W.B.
			129·1	1·91	2	...	8·927	L.
			127·5	1·74	1	...	8·969	B.
Hough. 326	4 2	61 40	175·1	0·30	1	8·5 8·5	7·865	L.
			177·3	0·38	1	...	8·890	L.
β 1232 ...	4 2	61 11	353·2	0·36	1	8·5 9·5	6·093	L.
			358·0	0·15	1	...	8·890	L.
OΣ 79 ...	4 14	73 45	115·5	...	1	6·4 7·6	6·039	L.
OΣ 80 ...	4 17	47 47	179·1	0·67	1	6·5 7·0	8·964	L.
OΣ 82 ...	4 18	75 12	136·6	0·63	2	8·0 8·7	6·083	L.
			129·1	0·40	1	...	7·860	W.B.
β 1235 ...	4 18	67 29	46·2	0·35	1	8·4 8·5	6·093	L.
			65·4	0·34	1	...	8·121	W.B.
Σ 535 ...	4 18	78 51	336·9	0·96	1	6·7 8·2	6·115	D.
			329·7	1·42	2	...	7·442	W.B.
			322·5	1·50	1	...	8·947	W.B.
Hastings ...	4 30	70 29	45·2	0·49	1	8 9	8·131	W.B.
OΣ 86 ...	4 31	70 27	53·2	0·53	1	7·5 7·5	8·637	W.B.
Σ 567 ...	4 31	70 40	323·1	1·75	1	8·5 9·0	8·950	L.
Σ 572 ...	4 32	63 16	197·0	3·82	1	6·5 6·5	6·074	D.
			199·9	3·91	3	...	7·970	W.B.
			201·2	3·62	2	...	8·126	W.B.
			204·2	3·69	2	...	8·544	B.
β 883 A.B.	4 46	79 6	205·5	...	1	7·5 7·8	7·000	D.
			36·1	0·35	5	...	7·664	L.
			34·7	0·39	2	...	7·902	W.B.
			38·7	0·32	2	...	8·106	L.
			51·4	0 36	1	...	8·950	L.

Star's Name.	R.A. 1900.	N.P.D. 1900.	Position Angle.	Distance	No. of Nights	Mags.	Epoch 1890 +	Obs.
	h m	° ′	°	″				
β 883 A.C.	4 46	79 6	153·1	18·04	1	7·5 13	7·800	L.
			153·9	17·92	1	...	7·977	W.B.
β 552 ...	4 46	76 31	191·7	0·48	1	6·9 10·2	7·975	L.
			188·1	0·43	1	...	8·052	L.
OΣ 98 (ι Orionis)	5 2	81 39	180·7	0·83	1	5·5 7·0	6·112	D.
			176·3	1·18	1	...	8·104	B.
			183·2	0·81	1	...	8·145	L.
Σ 645 A.C.	5 3	62 5	22·3	11·78	1	6·0 8·5	6·110	L.
			28·3	11·93	1	...	8·107	L.
β 1047 A.B.	5 3	62 5	50·3	0·21	1	8·5 8·8	6·110	L.
OΣ 100 ...	5 5	81 57	251·2	4·29	1	...	8·093	B.
Σ 687 A.B.	5 15	56 17	68·9	17·57	2	8·1 8·6	8·192	L.
β 886 C.D.	5 15	56 17	258·2	0·82	2	9·1 9·6	8·197	L.
β 887 A.B.	5 16	56 40	198·0	0·91	1	8·9 9·7	8·249	L.
A.C.	...	...	335·2	10·55	1	8·9 12	8·238	L.
Dawes 5 (η Orionis)	5 19	92 30	81·1	0·71	1	3·5 5·5	6·112	D.
			81·8	0·97	1	...	8·013	B.
Σ 728 ...	5 26	84 7	176·3	0·32	1	5·5 6·5	6·131	L.
Σ 749 ...	5 30	63 8	178·6	0·84	2	7·1 7·2	6·515	L.
			177·6	0·74	1	...	7·156	L.
			168·9	0·93	3	...	7·653	W.B.
			172·4	0·94	1	...	8·104	B.
			170·9	0·70	2	...	8·137	W.B.
✶ near Σ 749	...	...	287·8	4·43	1	...	7·006	W.B.
OΣ 112 ...	5 33	52 6	75·6	...	1	7·5 7·5	8·121	W.B.
			72 6	0·70	1	...	8·238	L.
β 560 ...	5 42	60 18	167·5	...	1	8·0 8·5	8·121	W.B.
			163·3	0·69	2	...	8·594	L.
OΣ 118 ...	5 42	69 10	317·1	0·64	1	8·0 8·8	7·156	L.
			308·3	0·53	1	...	7·966	W.B.
			313·5	0·68	2	...	8·128	W.B.
Σ 799 ...	5 45	51 31	183·6	1·01	1	7·0 8	7·156	L.
			176·5	0·82	1	...	8·104	B.
			178·6	0·75	2	...	8·126	W.B.
			179·2	0·80	1	...	8·238	L.
Σ 881 ...	6 12	30 33	105·9	0·55	1	6·4 9·7	8·025	L.
Σ 888 ...	6 14	61 31	251·8	2·73	2	7·5 9·2	8·594	L.
β 1021 ...	6 25	61 33	77·0	0·66	1	8·1 9·4	8·238	L.
Σ 919 A.B.	6 25	96 57	132·4	7·29	1	5·0 5·5	8 953	B.

Star's Name.	R.A. 1900.	N.P.D. 1900.	Position Angle.	Distance.	No. of Nights.	Mags.	Epoch 1890+	Obs.
	h m	° ′	°	″				
Σ 919 B.C.	...	...	102·8	2·93	1	5·5 6·0	8·953	B.
OΣ 149 ...	6 30	62 38	282·0	0·63	2	7 9	8·238	L.
Σ 936 ...	6 30	31 48	266·5	1·99	1	7·0 8·7	7·934	W.B.
			266·4	1·52	2	...	8·042	L.
Σ 948 A.B.	6 37	30 27	121·8	1·64	1	5·2 6·1	8·025	L.
			119·5	1·60	1	...	8·969	B.
A.C.	6 37	30 27	306·7	8·59	1	5·2 7·4	8·025	L.
			306·1	8·61	1	...	8·969	B.
Sirius ...	6 41	106 34	179·2	4·68	1	1 10	8·214	L.
OΣ 156 ...	6 41	71 41	302·1	0·53	1	7·0 7·0	8·164	W.B.
Σ 963 ...	6 43	30 26	79·4	0·54	1	5·9 7·1	8·025	L.
			72·5	0·39	1	...	8·969	B.
β 899 ...	6 53	71 8	265·1	0·81	1	8 7 9·3	6·110	L.
Σ 1037 A.B.	7 7	62 35	306·6	0·84	1	7·0 7·1	8·104	B.
			303·9	0·66	2	...	8·208	W.B.
			303·8	0·68	1	...	8·255	L.
A.C.	...	...	109·5	15·48	1	7 0 11·0	8·255	L.
OΣ 170 ...	7 11	80 31	108·4	1·46	1	7·0 7·5	8·104	B.
			110·3	1·36	1	...	8·164	W.B.
Σ 1074 A.B.	7 15	89 25	133·8	0·68	1	7·8 8·2	6·255	L.
β 577 A.C.	7 15	89 25	103·5	13·77	1	7·8 13·2	6·255	L.
β 21 ...	7 23	82 49	28·2	4·04	2	5·7 11·2	8·249	L.
OΣ 173 A.C.	7 28	56 38	231·3	16·72	1	...	8·244	L.
Σ 1110 (Castor)	7 28	57 53	227·4	5·90	2	2·7 3·7	6·075	L.
			228·1	5·97	3	...	7·142	L.
			225·7	5·74	2	...	7·142	W.B.
			226·0	5·62	3	...	8·180	W.B.
			227·6	5·78	1	...	8·244	L.
OΣ 175 ...	7 29	58 49	324·2	1·02	1	6·0 6·6	6·074	L.
			331·7	0·78	2	...	8·199	W.B.
			331·5	0·72	2	...	8·254	L.
Procyon ...	7 34	84 28	326·0	4·26	3	1 10	8·238	L.
Σ 1126 ...	7 34	84 28	142·2	1·01	2	7·0 7·0	8·233	L.
			141·8	1·24	1	...	8·255	P M.
OΣ 177 ...	7 35	52 19	122·9	0·53	1	7 7	7·309	L.
			129·7	0·58	1	...	8 238	L.
			124·5	0·45	1	...	8·263	W.B.
OΣ 182 ...	7 47	86 21	211·6	0·94	1	7·0 7·5	6·266	L.
Σ 1157 ...	7 49	92 31	246·3	1·07	1	8·0 8·0	6·112	D.

Star's Name.	R.A. 1900.	N.P.D. 1900.	Position Angle.	Distance	No. of Nights	Mags.	Epoch 1890+	Obs.
	h m	° ′	°	″				
OΣ 185 ...	7 52	88 35	196·7	0·47	1	6·8 7·1	6·268	L.
β 581 A.B.	7 59	77 25	272·8	0·59	3	8·5 8·6	6·183	L.
			271·0	0·35	1	...	8·164	W.B.
			271·4	0·49	1	...	8·255	L.
A.C.	7 59	77 25	197·0	5·13	3	8·5 11·5	6·183	L.
			201·7	4·89	1	...	8·255	L.
β 582 B.C.	7 59	77 38	58·0	4·39	1	8·7 11·5	6·142	L.
Σ 1179 A.B.	7 59	77 38	204·8	20·43	1	8·5 8·7	6·142	L.
Σ 1187 ...	8 3	57 28	222·0	2·17	1	7·1 8·0	6·142	L.
			225·8	2·04	1	...	7·131	L.
			226·9	1·90	1	...	7·131	W.B.
			224·3	2·18	2	...	8·197	W.B.
Σ 1196 A.B. (ζ Cancri)	8 7	72 3	18·1	1·03	6	5·0 5·7	6·181	L.
			12·9	1·07	1	...	7·131	W.B.
			8·2	1·43	1	...	7·131	L.
			11·1	1·05	5	...	8·187	W.B.
			14·6	1·12	1	...	8·255	L.
A.C.	8 7	72 3	116·3	5·22	6	5·0 5·5	6·181	L.
			115·5	5·20	1	...	7·131	W.B.
			115·0	5·28	1	...	7·131	L.
			115·3	5·25	5	...	8·187	W.B.
			118·8	5·56	1	...	8·255	L.
B.C.	8 7	72 3	128·9	5·50	1	5·7 5·5	6·181	L.
			125·7	5·67	1	...	7·131	W.B.
			123·5	5·47	1	...	7·131	L.
			130·1	5·65	2	...	8·214	W.B.
			128·6	5·79	1	...	8·255	L.
Σ 1202 ...	8 8	78 50	319·1	2·43	2	7·3 9·5	6·285	L.
			317·3	1·87	1	...	8·153	W.B.
β 1244 ...	8 8	87 41	40·1	0·65	1	7·9 8·1	6·268	L.
Σ 1205 ...	8 11	33 14	177·7	...	1	8·8 9·3	7·307	W.B.
Σ 1211 ...	8 11	50 41	307·1	0·81	1	9·1 9·6	6·301	L.
			307·0	0·77	1	...	7·309	L.
Σ 1216 ...	8 16	91 16	184·5	0·87	1	7·5 8·2	6·230	D.
Σ 1273 A.B.	8 41	83 12	212·0	0·22	3	3·5 6·0	6·215	L.
Σ Hydræ ...	...	...	204·1	...	1	...	6·244	D.
A.C.	8 41	83 12	230·3	3·56	3	3·5 7·4	6·215	L.
			229·3	3·22	2	...	6·235	D.
			231·8	3·83	1	...	7·364	B.

Star's Name.	R.A. 1900.	N.P.D. 1900.	Position Angle.	Distance.	No. of Nights.	Mags.	Epoch 1890+	Obs.
	h m	° ′	°	″				
Perrotin ..	8 46	81 18	348·7	0·65	2	7·9 8·6	6·189	L.
Σ 3121 ...	9 12	61 0	194·5	0·69	2	7·5 7·8	6·155	L.
			195·2	0·70	1	...	6·244	D.
			196·1	0·70	1	...	7·309	L.
			194·4	0·46	3	...	8·248	W.B.
			189·4	0·63	1	...	8·255	L.
OΣ 201 ...	9 18	61 40	221·6	1·34	2	7·5 8·9	6·222	L.
			226·7	...	1	...	7·306	W.B.
			222·4	1·25	1	...	7·315	L.
Σ 1348 ...	9 19	83 13	322·0	1·77	2	7·5 7·6	6·222	L.
Σ 1356 (ω Leonis)	9 23	80 30	107·9	0·56	2	6·2 7·0	6·222	L.
			105·8	0·94	1	...	6·244	D.
			107·5	0·84	1	...	7·156	L.
			113·6	0·65	1	...	8·293	B.
			113·7	0·63	1	...	8·345	L.
β 1071 (θ Urs. Maj.)	9 28	37 54	87·1	5·00	1	3 14	8·342	L.
OΣ 208 (φ Urs. Maj.)	9 45	35 28	275·7	0·53	1	5·0 5·6	8·359	L.
Σ 1389 ...	9 47	62 33	310·4	...	1	8·0 9·0	7·306	W.B.
			309·7	1·72	1	...	8·153	W.B.
OΣ 215 ...	10 11	71 46	209·3	0·82	3	6·7 7·0	6·235	L.
			208·9	1·01	1	...	6·244	D.
			207·2	0·77	2	...	7·325	L.
			207·5	0·65	4	...	8·202	W.B.
Σ 1421 ...	10 12	62 0	151·4	4·81	1	7·5 8·5	6·170	L.
Σ 1424 (γ Leonis)	10 14	69 39	115·6	3·63	1	2·0 3·5	6·309	L.
			114·4	3·72	2	...	8·192	W.B.
Σ 1426 A.B.	10 15	83 4	281·3	0·65	1	7·8 8·3	6·307	L.
			281·3	0·63	2	...	8·274	W.B.
A.C.	...	...	5·9	7·75	1	7·8 9·3	6·307	L.
			6·9	7·98	2	...	8·274	W.B.
OΣ 216 ...	10 17	74 8	127·7	0·96	1	7 11	6·301	L.
			125·4	1·02	1	...	7·340	L.
Σ 1429 ...	10 19	64 50	246·4	...	1	8·1 8·5	7·306	W.B.
			251·1	0·83	3	...	8·186	W.B.
OΣ 217 ...	10 21	72 15	145·6	0·76	4	7·3 7·8	6·253	L.
			151·1	0·71	5	...	8·215	W.B.
OΣ 218 ...	10 22	85 56	74·0	1·04	1	7 9	6·307	L.
Σ 1457 ...	10 33	83 44	316·9	1·16	1	7·4 8·2	8·307	W.B.

Star's Name.	R.A. 1900 h m	N.P.D. 1900. ° ′	Position Angle. °	Distance ″	No. of Nights	Mags.	Epoch 1890+	Obs.
OΣ 224 ...	10 34	80 38	313·3	0·40	2	7·4 8·5	6·285	L.
			317·4	0·58	1	...	7·340	L.
OΣ 225 A.C.	10 35	70 15	350·5	6·54	1	8·2 10·0	6·301	L.
(Perrotin) A.B.	...	...	246·8	0·75	1	8·2 11·2	6·301	L.
OΣ 227 ...	10 35	78 34	343·7	0·48	1	8 9	7·340	L.
			346·3	0·55	1	...	8·296	W.B.
OΣ 228 ...	10 42	66 47	176·2	0·49	1	7 8	7·340	L.
			186·7	0·58	3	...	8·267	W.B.
			189·7	0·53	1	...	8·301	L.
β 915 ...	10 43	65 5	226·2	...	1	9 9	7·306	W.B.
OΣ 229 ...	10 44	48 21	321·3	1·02	2	6 7	7·230	W.B.
			317·7	0·94	2	...	7·234	L.
			324·2	0·93	1	...	8·142	B.
			321·7	0·89	2	...	8·287	L.
Σ 1504 ...	10 59	85 47	289·1	1·14	2	7·4 7·5	8·340	W.B.
Σ 1523 (ξ Urs. Maj.)	11 13	57 54	170·6	2·00	1	4·0 4·9	6·309	L.
			163·8	1·94	1	...	7·315	L.
			159·4	2·17	1	...	8·222	L.
			157·4	2·16	1	...	8·455	B.
Σ 1527 ...	11 13	75 9	17·7	3·54	1	7·1 8·0	8·364	B.
Σ 1534 ...	11 16	71 14	329·8	5·72	1	8·0 11·0	8·307	W.B.
Σ 1536 (*i* Leonis)	11 19	78 54	59·6	2·53	1	3·9 7·1	6·337	L.
			55·3	2·20	1	...	8·263	W.B.
			54·7	2·65	1	...	8·364	B.
OΣ 234 ...	11 26	58 11	7·2	0·13	1	7·0 7·4	7·315	L.
Σ 1555 A.B.	11 31	61 40	345·4	0·42	2	6·4 6·8	6·326	L.
			353·2	0·36	2	...	7·361	L.
			352·2	0·53	2	...	8·262	L.
			350·6	0·51	2	...	8·307	W.B.
A.C.	11 31	61 40	147·0	21·43	2	6·4 10·3	7·361	L.
			145·1	20·57	2	...	8·262	L.
			146·9	20·76	2	...	8·307	L.
OΣ 237 ...	11 33	48 16	263·8	1·08	2	8 9	8·354	L.
β 603 ...	11 45	75 5	320·6	0·87	1	6·4 10·3	6·340	L.
			319·7	0·78	1	...	7·359	L.
			323·2	0·98	1	...	8·301	L.
			321·1	0·88	1	...	8·318	W.B.
Σ 1606 ...	12 5	49 31	334·0	0·91	3	6·2 7·0	8·337	L.

Star's Name.	R.A. 1900.	N.P.D. 1900.	Position Angle.	Distance.	No. of Nights.	Mags.	Epoch 1890+	Obs.
	h m	° ′	°	″				
Σ 1621 ...	12 11	83 45	133·8	2·47	1	8·8 10·3	8·307	W.B.
			134·5	2·47	1	...	8·364	B.
Σ 1639 (68 Comæ)	12 19	63 52	199·3	0·15	1	6·5 8·0	6·340	L.
			round	...	1	...	6·367	L.
			196·8	0·24	2	...	7·361	L.
			193·6	0·20	1	...	8·307	L.
Σ 1643 ...	12 22	62 23	41·0	2·06	2	8·3 8·6	7·356	W.B.
			37·9	1·91	1	...	8·296	W.B.
			42·6	2·00	1	...	8·307	L.
Σ 1647 ...	12 25	79 44	222·6	1·37	2	7·5 8·0	7·300	W.B.
			224·6	1·00	1	...	7·342	L.
			224·4	0·89	1	...	8·296	W.B.
			218·1	0·97	2	...	8·410	B.
Σ 1658 ...	12 30	81 58	358·4	2·46	1	8·0 9·8	6·334	L.
			360·2	2·38	1	...	7·392	L.
			361·0	2·54	1	...	8·301	L.
			356·8	2·67	1	...	8·307	W.B.
			358·0	2·54	3	...	8·377	B.
Σ 1661 ...	12 31	78 1	241·9	2·32	1	8·5 8·5	7·392	L.
			237·1	2·51	1	...	8·296	W.B.
			235·4	2·84	1	...	8·364	B.
Σ 1663 ...	12 32	68 13	101·8	0·71	2	7·8 8·7	6·345	L.
			107·5	0·60	2	...	7·387	L.
			109·0	0·89	1	...	8·293	B.
			102·8	0·65	1	...	8·301	L.
			100·6	0·64	1	...	8·318	W.B.
Σ 1670 (γ Virg.)	12 36	90 52	153·2	5·96	1	3·0 3·0	6·367	L.
			150·0	5·99	1	...	7·319	W.B.
			150·7	5·59	1	...	8·307	W.B.
			149·0	5·99	2	...	8·355	B.
Σ 1687 A.B.	12 48	68 11	74·7	1·10	4	5·1 7·8	6·342	L.
			71·6	1·06	1	...	7·340	L.
			76·5	1·24	1	...	8·296	W.B.
			76·8	1·30	1	...	8·301	L.
			77·4	1·37	2	...	8·374	B.
A.C.	12 48	68 11	126·7	28·80	1	5·1 9·0	7·340	L.
			125·2	28·85	1	...	8·301	L.
			124·2	...	1	...	8·455	B.
OΣ 256 ...	12 51	90 25	263·4	0·80	1	7·0 7·5	6·381	D.

Star's Name.	R.A. 1900 h m	N.P.D. 1900. ° ′	Position Angle.	Distance.	No. of Nights.	Mags.	Epoch 1890+	Obs.
OΣ 256 ...	12 51	90 25	258·3	0″·75	1	7·0 7·5	6·367	L.
β 112 ...	12 55	70 59	292·0	2·24	1	9·1 9·8	6·416	L.
			293·1	2·40	1	...	8·293	B.
			294·3	1·68	1	...	8·375	L.
β 1082 ...	12 57	33 5	85·4	1·26	3	6·0 9·6	8·295	L.
Σ 1711 ...	12 57	75 59	349·6	0·98	1	8·5 9·0	6·416	L.
			349·5	0·82	1	...	7·343	L.
			349·3	0·89	3	...	8·332	W.B.
			353·9	1·01	1	...	8·364	B.
			347·7	0·89	1	...	8·375	L.
β 929 ...	12 58	93 7	212·3	0·60	1	6·0 6·3	8·318	W.B.
β 930 ...	13 1	44 12	116·7	2·75	1	6·2 11·3	8·430	L.
			119·0	3·07	1	...	8·460	B.
β 1083 A.B.	13 2	60 26	221·1	6·08	1	6·5 11·5	7·381	L.
			218·1	6·49	2	...	8·366	L.
A.C.	13 2	60 26	243·6	0·42	1	11·5 11·7	7·381	L.
			234·7	0·40	1	...	8·301	L.
OΣ 260 ...	13 3	62 31	123·7	0·53	2	8 8	7·361	L.
			126·1	0·58	2	...	8·307	W.B.
			120·2	0·54	2	...	8·357	L.
Σ 1728 (42 Comæ)	13 5	71 57	201·1	0·15	1	5·5 5·9	6·334	L.
			204·7	...	1	...	6·381	D.
			350·1	0·07	1	...	7·340	L.
			round	...	1	...	7·364	L.
			204·0	0·17	3	...	8·395	L.
OΣ 261 ...	13 7	57 22	346·3	1·31	1	7·0 7·5	7·392	L.
			345·6	1·40	1	...	8·490	L.
			345·0	1·24	2	...	8·507	W.B.
β 800 ...	13 11	72 20	115·0	2·60	2	7·5 10·2	6·405	L.
			112·1	2·44	1	...	7·392	L.
			113·5	2·33	1	...	8·370	W.B.
			117·0	2·53	3	...	8·395	L.
Σ 1733 ...	13 11	72 10	125·2	5·21	2	8·2 9·8	6·392	L.
			127·2	4·91	1	...	7·392	L.
			127·0	4·82	2	...	8·375	L.
Σ 1734 ...	13 15	86 30	189·7	0·85	1	7 8	8·307	W.B.
			187·0	1·24	1	...	8·313	B.
Σ 1742 ...	13 19	88 0	351·4	1·09	1	7·4 7·9	8·307	W.B.
OΣ 266 ...	13 23	73 41	339·1	1·70	2	7·3 7·8	6·411	L.

Star's Name.	R.A. 1900.	N.P.D. 1900.	Position Angle.	Distance	No. of Nights.	Mags.	Epoch 1890+	Obs.
	h m	° ′	°	″				
OΣ 266 ...	13 23	73 41	341·7	1·57	1	7·3 7·8	7·392	L.
			338·2	1·51	3	...	8·328	W.B.
			340·4	1·65	2	...	8·397	L.
OΣ 269 ...	13 28	54 34	202·7	0·38	1	6·5 7·0	6·312	L.
			214·0	0·10	2	...	7·357	L.
			214·5	0·30	2	...	8·462	L.
Σ 1768 ...	13 33	53 10	136·3	1·17	1	5·0 7·6	6·312	L.
			133·3	1·03	1	...	7·392	L.
			140·0	0·92	2	...	8·460	L.
			139·6	0·68	1	...	8·504	W.B.
			133·3	0·97	2	...	8·559	B.
β 612 ...	13 34	78 45	212·1	0·34	2	6·0 6·5	6·410	L.
			223·9	0·33	2	...	7·366	L.
			210·9	0·48	1	...	8·318	W.B.
			221·0	0·39	2	...	8·397	L.
Σ 1777 ...	13 38	85 55	228·0	3·76	1	5·8 8·2	6·381	D.
Σ 1781 ...	13 41	82 23	272·3	1·07	1	7·5 8·0	6·381	D.
			278·8	1·27	1	...	7·371	W.B.
			278·9	0·95	1	...	7·413	L.
Σ 1785 ...	13 44	62 30	263·2	1·44	1	7·2 7·5	6·383	L.
			264·0	1·31	2	...	7·352	W.B.
			268·4	1·41	1	...	8·318	W.B.
β 613 ...	13 48	54 50	153·6	0·48	1	9·1 9·1	8·430	L.
β 1270 ...	13 59	80 52	356·2	0·43	1	8·2 8·3	6·405	L.
			346·0	0·27	1	...	7·413	L.
			341·8	0·43	2	...	8·438	L.
			344·9	0·45	1	...	8·438	W.B.
β 30	13 53	70 2	201·3	8·75	1	8·0 11·0	8·457	L.
Σ 1808 ...	14 5	62 54	78·1	3·40	1	8·0 9·0	6·457	W.B.
			69·5	3·39	1	...	7·353	B.
			74·7	2·91	1	...	7·378	W.B.
OΣ 278 ...	14 8	45 21	97·5	0·27	1	7·5 7·5	8·430	L.
Σ 1819 ...	14 10	86 22	5·0	1·50	1	7·9 8·0	6·465	D.
			2·9	1·30	1	...	7·318	W.B.
			0·0	1·23	1	...	8·427	W.B.
			1·4	1·26	1	...	8·457	L.
β 1272 A.B.	14 14	40 47	132·8	1·32	2	8·4 9·5	7·520	L.
			129·3	1·18	1	...	8·528	L.
			134·2	1·44	1	...	8·630	B.

Star's Name.	R.A. 1900.	N.P.D. 1900.	Position Angle.	Distance.	No. of Nights.	Mags.	Epoch 1890+	Obs.
	h m	° ′	°	″				
β 1272 A.C.	14 14	40 47	319·0	...	2	8·4 8·5	7·520	L.
			321·4	23·60	1	...	8·630	B.
β 1273 ...	14 15	41 35	193·3	0·94	2	8·6 9·8	7·520	L.
			199·4	0·80	1	...	8·528	L.
			193·6	...	1	...	8·630	B.
Σ 1834 ...	14 17	40 56	166·5	...	1	7·5 7·5	7·512	L.
			round	...	1	...	7·630	B.
Σ 1835 A.B.	14 18	81 6	189·9	6·59	3	5·0 8·2	8·417	L.
B.C.	...	...	336·6	0·30	2	8·2 6·8	8·438	L.
Σ 1837 ...	14 19	101 12	305·4	0·68	1	7·0 8·0	6·381	D.
Σ 1865 (ζ Bootis)	14 36	75 49	93·2	0·21	1	3·5 3·9	6·383	L.
			round	...	2	...	7·367	L.
			78	...		...	7·413	L.
			72·4	0·1	2	...	8·443	L.
Σ 1867 ...	14 36	58 15	15·3	1·24	1	7·7 8·2	6·457	W.B.
			16·1	1·03	1	...	7·320	L.
			13·0	1·28	2	...	7·326	W.B.
			13·1	0·82	2	...	8·471	W.B.
			14·7	1·28	2	...	8·471	B.
			17·1	1·19	1	...	8·528	L.
Σ 1866 ...	14 37	80 2	208·3	1·11	1	8·0 8·0	8·608	B.
Σ 1870 ...	14 37	81 29	230·1	4·64	1	7·5 10	8·608	B.
Σ 1877 (ϵ Bootis)	14 38	62 29	327·4	3·12	1	3·0 6·3	6·457	W.B.
			323·7	3·01	1	...	7·378	W.B.
			329·1	2·81	1	...	8·438	W.B.
			334·8	2·87	1	...	8·455	B.
Σ 1879 ...	14 41	79 55	144·8	0·49	3	8·0 8·5	6·382	L.
			136·3	0·60	2	...	7·354	W.B.
			140·4	0·38	3	...	7·370	L.
			136·4	0·53	1	...	8·427	W.B.
			139·5	0·46	4	...	8·437	L.
0Σ 285 ...	14 42	47 11	326·9	0·41	2	7·1 7·6	7·322	L.
Σ 1883 ...	14 44	83 38	254·7	0·56	1	7·0 7·0	6·383	L.
			245·9	0·55	1	...	8·452	L.
			245·6	0·52	2	...	8·482	W.B.
			242·9	0·72	1	...	8·487	B.
Σ 1888 (ξ Bootis)	14 47	70 27	220·6	2·83	1	5·1 7·4	6·383	L.
			218·7	2·55	1	...	6·463	C.
			218·8	2·83	1	...	6·463	W.B.

Star's Name.	R.A. 1900.	N.P.D. 1900.	Position Angle.	Distance.	No. of Nights	Mags.	Epoch 1890+	Obs.
	h m	° ′	°	″				
Σ 1888 (ξ Bootis)	14 47	70 27	219·2	2·82	1	5·1 7·4	7·334	W.B.
			212·2	2·87	1	...	8·293	B.
			216·1	2·99	1	...	8·451	L.
β 942 ...	14 47	89 58	200·1	0·94	1	9·1 9·2	7·446	L.
OΣ 287 ...	14 47	44 38	319·2	0·69	2	8 9	7·322	L.
			317·7	0·85	1	...	7·329	W.B.
			319·0	0·81	2	...	8·559	B.
β 31 A.B.	14 48	70 50	194·5	1·53	2	8·4 9·7	6·375	L.
			193·7	1·52	1	...	7·438	W.B.
			194·4	1·36	1	...	7·446	L.
			196·2	1·45	1	...	8·452	L.
A.C.	14 48	70 50	167·3	9·76	2	8·4 12·2	6·375	L.
			166·0	9·05	1	...	8·457	L.
OΣ 288 ...	14 49	73 51	188·9	1·67	2	6·5 7·0	6·367	L.
			189·4	1·33	1	...	7·444	W.B.
			191·2	1·40	1	...	8·451	L.
			191·8	1·28	1	...	8·531	B.
Σ 1908 ...	15 1	55 7	140·7	1·30	3	8 9	7·471	W.B.
			146·7	1·10	1	...	8·504	W.B.
			146·8	1·38	1	...	8·528	L.
Σ 1926 ...	15 12	51 20	251·8	0·91	1	6·5 8·2	8·528	L.
Σ 1932 ...	15 14	62 48	141·8	0·78	2	5·5 6·0	6·367	L.
			145·5	0·77	3	...	7·347	W.B.
			145·4	0·79	2	...	7·369	L.
			145·1	0·65	1	...	8·531	W.B.
Σ 1937 (η Cor. Bor.)	15 19	59 21	130·8	0·44	3	5·0 5·7	6·347	L.
			149·1	0·40	4	...	7·359	L.
			166·1	0·42	1	...	8·468	W.B.
			161·2	0·37	2	...	8·492	L.
Σ 1938 ...	15 20	52 16	79·4	0·86	3	4 6	7·334	L.
OΣ 296 ...	15 22	45 38	313·4	1·63	1	8 9	7·329	W.B.
			302·2	1·35	1	...	8·531	W.B.
			308·7	1·54	1	...	8·534	L.
			300·1	1·50	1	...	8·706	B.
Σ 1957 ...	15 31	76 42	156·3	1·17	1	8·0 9·5	6·356	L.
			158·4	1·35	1	...	6·465	C.
			157·1	1·07	1	...	7·323	L.
			151·1	1·28	3	...	7·374	W.B.
			153·1	1·30	1	...	8·427	W.B.

Star's Name.	R.A. 1900. h m	N.P.D. 1900. ° ′	Position Angle. °	Distance. ″	No. of Nights.	Mags.	Epoch 1890+	Obs.
OΣ 298 ...	15 32	49 50	176·0	0·85	2	7 8	7·418	L.
			173·7	1·01	2	...	7·433	W.B.
			178·9	1·03	1	...	8·531	W.B.
			178·0	0·90	1	...	8·534	L.
Σ 1967 (γ Cor. Bor.)	15 38	63 18	118·5	0·60	1	4·0 7·0	6·454	L.
			120·1	0·44	4	...	7·429	L.
			118·8	0·84	1	...	8·487	B.
			114·4	0·43	2	...	8·496	L.
			117·1	0·55	1	...	8·531	W.B.
β 621 ...	15 47	44 55	57·0	0·54	1	8·1 9·3	8·534	L.
OΣ 303 ...	15 56	76 28	138·4	0·89	1	7·0 8·0	6·353	L.
			141·2	0·88	2	...	7·381	W.B.
			141·6	0·67	2	...	7·436	L.
			140·4	0·80	3	...	8·474	W.B.
			146·7	1·03	1	...	8·487	B.
Σ 2015 A.C.	16 5	44 22	160·2	2·67	1	7·8 8·8	7·342	L.
			160·5	3·00	1	...	8·531	W.B.
			162·0	2·71	1	...	8·534	L.
β 355 A.B.	16 5	44 22	278·5	0·44	1	7·8 8·9	7·342	L.
			278·1	0·42	2	...	8·534	W.B.
A.D.	16 5	44 22	99·2	12·87	1	7·8 13	8·531	W.B.
			98·0	12·49	1	...	8·534	L.
Σ 2021 ...	16 8	76 12	332·6	3·99	2	7·0 7·1	8·630	B.
Σ 2026 ...	16 12	82 21	266·5	0·78	1	8·5 9·5	7·372	W.B.
			260·0	0·79	1	...	8·528	W.B.
Σ 2032 ...	16 11	55 53	212·1	4·14	1	5·0 6·1	6·449	L.
			209·0	4·17	1	...	6·454	W.B.
			211·6	4·42	1	...	7·372	L.
			213·9	4·58	1	...	8·641	B.
β 951 ..	16 20	56 26	56·8	1·07	1	8·1 9·0	8·531	L.
β 814 ...	16 24	49 53	325·2	0·28	1	8·4 8·4	8·534	L.
Σ 2052 ...	16 24	71 21	95·8	2·32	1	7·5 7·5	6·463	C.
			95·2	1·81	3	...	7·428	W.B.
			94·8	1·50	1	...	8·439	W.B.
			94·1	1·83	1	...	8·599	L.
			94·0	1·93	1	...	8·619	B.
Σ 2055 (λ Oph.)	16 25	87 47	47·0	1·40	2	4·0 6·1	6·486	L.
			50·6	1·59	1	...	8·487	B.
Σ 3105 ...	16 26	96 46	24·8	0·75	1	7·5 7·5	8·487	B.

Star's Name.	R.A. 1900.	N.P.D. 1900.	Position Angle.	Distance.	No. of Nights.	Mags.	Epoch 1890+	Obs.
	h m	° ′	°	″				
Σ 2084 (ζ Herc.)	16 36	58 12	6·0	0·54	2	3·0 6·5	6·452	L.
			2·3	0·46	3	...	7·404	L.
			288·0	0·63	3	...	8·588	L.
			288·8	0·56	2	...	8·665	W.B.
			285·3	0·40	1	...	8·739	B.
Σ 2091 ...	16 39	48 37	302·1	0·82	1	7·5 8·0	7·323	L.
			309·8	0·81	1	...	7·334	W.B.
			303·5	0·99	1	...	8·613	W.B.
			304·8	1·07	1	...	8·663	B.
			303·1	0·89	1	...	8·704	L.
De. 15 ...	16 40	46 30	329·5	0·30	1	8·0 8·5	7·323	L.
			328·3	0·52	1	...	8·613	W.B.
			327·8	0·50	1	...	8·704	L.
Σ 2106 ...	16 47	80 26	300·6	0·44	1	6·7 8·4	6·460	L.
OΣ 315 ...	16 46	88 37	165·1	0·65	1	6 8	7·444	W.B.
			163·1	0·67	1	...	7·501	L.
Σ 2107 ...	16 48	61 10	293·9	0·44	1	6·7 8·5	7·603	L.
Σ 3107 ...	16 53	85 53	96·2	1·33	1	8·5 8·5	6·520	L.
Σ 2114 ...	16 56	81 24	157·6	1·14	2	6·5 8·0	6·538	L.
			162·6	0·99	1	...	7·444	W.B.
			158·9	1·10	1	...	8·427	W.B.
Σ 2118 ...	16 56	24 50	22·2	0·18	1	5·5 6·5	7·342	L.
Σ 2120 ...	17 0	61 45	242·8	6·16	1	6·8 9·0	8·857	L.
β 357 ...	17 1	79 19	300·0	0·99	2	8·4 9·4	6·529	L.
Σ 2140 (α Herc.)	17 10	75 30	115·9	4·87	1	3·0 6·1	6·526	L.
			115·7	4·94	2	..	7·535	L.
			116·9	5·11	1	...	7·539	P.M.
OΣ 327 ...	17 12	33 45	321·1	0·34	1	7·6 8·0	7·381	L.
β 1200 ...	17 12	75 1	194·1	1·21	2	7·8 12·2	6·466	L.
✶	17 15	57 28	297·4	2·68	1	10·0 11·0	6·465	L.
β 629 ...	17 15	57 50	344·1	0·97	2	8·4 8·7	8·645	W.B.
			341·1	20	2	...	8·705	B.
β 630 ...	17 17	57 36	225·0		2	8·5 9·6	8·656	W.B.
			221·9	1·55	2	...	8·701	B.
β 46 ...	17 18	75 2	182·2	1·20	1	8·0 14·0	6·531	L.
Σ 2163 ...	17 20	47 45	93·2	1·42	1	10 10	8·608	B.
			93·2	1·62	2	...	8·650	W.B.
β 1250 ...	17 21	59 7	66·8	2·56	1	9·4 9·5	6·463	L.
			71·1	1·90	1	...	7·528	L.

Star's Name.	R.A. 1900. h m	N.P.D. 1900. ° ′	Position Angle. °	Distance. ″	No. of Nights.	Mags.	Epoch 1890+	Obs.
β 1250 ...	17 21	59 7	69·2	1·88	1	9·4 9·5	7·537	W.B.
			65·9	1·80	1	...	8·624	W.B.
			64·2	2·27	2	...	8·702	B.
			65·7	2·18	1	...	8·704	L.
Σ 2173 ...	17 25	90 59	337·3	1·29	1	6·0 6·3	6·580	D.
			336·4	0·97	1	...	6·580	L.
			334·7	...	1	...	6·580	N.
			333·7	0·90	1	...	7·444	W.B.
			341·1	1·22	2	...	8·743	B.
OΣ 331 ...	17 27	87 7	338·5	0·85	1	8·0 9·0	6·580	L.
			338·3	...	1	...	6·580	N.
			338·0	1·09	1	...	7·444	W.B.
*	17 26	87 4	11·3	0·78	1	10·0 12·0	6·580	L.
			16·2	...	1	...	6·580	N.
β 1121 ...	17 32	77 24	247·4	0·72	1	8·5 9·0	6·474	L.
			248·5	0·60	1	...	7·528	L.
			244·2	0·73	1	...	7·562	W.B.
β 631 ...	17 34	90 35	33·3	0·97	1	7·5 7·6	6·690	D.
β 1251 ...	17 38	73 59	84·9	1·25	3	6·0 11·5	6·508	L.
Σ 2203 ...	17 38	48 18	325·6	0·76	1	7·5 7·8	6·465	L.
			322·2	0·66	2	...	8·618	W.B.
			323·3	0·80	1	...	8·619	B.
Σ 2199 ...	17 37	34 12	88·6	1·73	2	7 8	8·630	B.
Σ 2205 ...	17 41	72 15	306·0	1·82	1	8·3 8·6	6·531	L.
			308·5	...	1	...	6·561	W.B.
			307·0	2·07	1	...	7·534	L.
			308·8	...	1	...	8·641	B.
Σ 2215 ...	17 42	72 16	293·3	0·79	2	5·9 8·0	6·504	L.
			296·9	0·61	2	...	7·534	L.
A.C. 7 (μ′ Herc.)	17 43	62 13	46·9	1·41	2	10·0 10·5	6·539	L.
OΣ 337 ...	17 45	82 44	102·8	0·45	2	7·5 7·5	6·601	L.
OΣ 338 ...	17 47	74 39	14·4	0·72	3	6·5 7·0	6·509	L.
			15·5	1·02	1	...	6·520	C.
*	17 47	74 39	352·6	0·84	1	...	6·476	L.
A.C. 9 ...	17 50	60 10	53·4	1·03	2	8·4 8·7	6·457	L.
β 1127 ...	17 59	45 47	147·0	0·57	1	7·8 9·7	7·756	L.
			139·6	0·74	1	...	8·613	W.B.
			135·6	0·76	1	...	8·704	L.

Star's Name.	R.A. 1900.	N.P.D. 1900.	Position Angle.	Distance.	No. of Nights.	Mags.	Epoch 1890+	Obs.
	h m	° ′	°	″				
Σ 2272 (70 Oph.)	18 0	87 27	288·1	2·33	6	4·3 6·3	6·590	W.B.
			289·5	2·23	1	...	6·608	D.
			290·9	2·18	1	...	6·619	N.
			290·1	2·03	5	...	6·649	L.
			282·5	2·01	9	...	7·520	W.B.
			282·5	1·89	1	...	7·578	L.
			273·4	1·82	8	...	8·526	W.B.
			273·7	1·75	1	...	8·619	B.
			269·6	1·62	1	...	8·704	L.
Σ 2275 ...	18 0	50 38	271·5	0·20	1	9·0 9·2	7·474	L.
			274·5	0·24	1	...	8·613	W.B.
			273·0	0·25	1	...	8·701	L.
			264·3	0·20	1	...	8·706	B.
∗	18 1	50 36	131·7	0·80	2	...	8·657	B.
			136·2	0·79	2	...	8·665	W.B.
			136·6	0·62	2	...	8·703	L.
A.C. 15 (99 Herc.)	18 3	59 27	305·0	0·85	2	6·0 11·0	6·616	L.
			312·0	0·99	1	...	8·418	L.
			308·8	0·99	1	...	8·663	B.
Σ 2289 ...	18 6	73 33	228·8	1·24	2	6·5 7·0	6·550	L.
			229·4	1·79	2	...	6·567	W.B.
			227·0	0·99	1	...	7·534	L.
			222·0	1·35	1	...	8·548	C.
Σ 2281 ...	18 4	86 2	229·2	0·43	2	5·7 7·2	6·594	L.
Σ 2285 ...	18 5	76 28	228·3	1·11	1	8·2 10·0	6·520	D.
			227·5	1·25	1	...	6·580	L.
β 1091 ...	18 9	51 26	25·4	0·66	1	8·6 8·6	6·693	L.
β 641 ...	18 17	68 33	336·5	1·31	1	7·3 9·0	6·611	D.
			346·5	0·92	4	...	6·625	L.
			349·4	1·04	2	...	7·531	L.
β 1203 ...	18 21	39 15	72·6	0·43	1	7·5 7·7	6·739	L.
Σ 2315 ...	18 21	62 39	218·3	0·29	2	7·5 9·0	6·596	L.
			210·5	0·32	2	...	7·579	L.
∗	18 20	62 40	315·6	4·26	1	9·5 10·5	6·742	L.
			321·1	4·87	2	...	7·579	L.
OΣ 543 ...	18 23	43 11	127·4	1·08	1	8·0 10·0	6·742	L.
			135·3	1·04	2	...	8·619	W.B.
			138·4	1·13	2	...	8·641	B.
OΣ 351 ...	18 23	41 19	24·6	0·49	1	7·0 7·0	6·742	L.

Star's Name.	R.A. 1900. h m	N P.D. 1900. ° ′	Position Angle. °	Distance. ″	No. of Nights	Mags.	Epoch 1890+	Obs.
OΣ 351 ...	18 23	41 19	16·6	0·55	2	7·0 7·0	8·619	W.B.
			22·9	0·57	2	...	8·641	B.
OΣ 354 ...	18 26	83 20	167·0	0·78	2	7 8	7·564	W.B.
OΣ 357 ...	18 31	78 34	262·3	0·34	2	...	8·646	W.B.
OΣ 358 ...	18 31	73 12	195·4	1·97	2	7·0 7·5	6·551	L.
			189·9	2·05	2	...	6·597	W.B.
			195·5	1·98	1	...	6·687	D.
			191·4	1·60	4	...	7·526	W.B.
			197 1	1·87	1	...	7·534	L.
Σ 2356 ...	18 34	61 23	61·3	0·81	2	8·2 8·6	6·452	L.
			53·7	0·90	1	...	7·737	L.
			54·2	1·18	1	...	8·663	B.
*	18 34	61 18	254·8	1·31	2	9·0 10·0	6·452	L.
			250·8	1·09	1	...	7·737	L.
			250·4	1·58	1	...	8·663	B.
Hough 87 ...	18 34	73 34	106·7	0·43	1	7·8 8·1	6·578	L.
Σ 2367 A.B.	18 37	73 12	267·5	0·25	2	7·2 7·6	7·521	L.
A.C.	...	...	191·3	14·11	1	7·2 8·2	7·455	L.
Σ 2384 ...	18 39	23 0	313·6	0·49	1	8·0 8·2	7·413	L.
Σ 2375 ...	18 41	84 36	114·0	2·34	2	6·2 6·6	6·611	W.B.
Σ 2400 A.B.	18 44	73 53	184·0	1·89	2	8·0 11·1	6·616	L.
			184·2	1·95	2	...	7·559	L.
A.C.	...	...	184·6	2·93	2	8·0 11·0	6·616	L.
			185·3	2·93	2	...	7·559	L.
			181·8	2·83	1	...	8·663	B.
A.D.	...	...	186·7	0·50	2	8·0 9·5	6·616	L.
			140·0	0·49	1	...	7·539	L.
B.C.	...	...	199·6	0·76	1	11·1 11·0	6·772	L.
			186·7	1·09	1	...	7·539	L.
β 971 ...	18 45	40 43	11·6	0·30	1	6·8 9·2	7·430	L.
Σ 2402 ...	18 45	79 25	207·6	0·74	1	8·0 8·4	7·575	W.B.
			205·6	0·92	1	...	8·468	W.B.
β 137 A.B.	18 50	52 45	132·3	1·34	3	8·2 8·7	6·597	L.
			136·7	1·55	1	...	6·772	W.B.
			128·2	1·47	1	...	7·438	W.B.
			130·6	1·24	2	...	7·462	L.
			127·9	1·29	1	...	8·468	L.
			127·3	1·29	1	...	8·624	W.B.
A.C.	...	...	321·0	18·20	1	8·2 11·5	6·460	L.

Star's Name.	R.A. 1900.	N.P.D. 1900.	Position Angle.	Distance.	No. of Nights.	Mags.	Epoch 1890+	Obs.
	h m	o ′	°	″				
β 137 A.C.	18 50	52 45	320·6	19·15	1	8·2 11·5	7·474	L.
*	18 50	52 37	169·0	6·22	1	...	6·772	L.
β 1255 ...	18 52	41 16	65·6	0·86	1	5·8 12·5	7·619	L.
Σ 3130 ...	18 53	45 55	262·3	2·50	3	6·7 10·4	7·444	L.
*	18 54	45 56	137·3	3·07	1	10 11	7·413	L.
Σ 2422 ...	18 53	64 2	98·5	0·59	1	7·9 8·2	7·586	L.
			91·6	0·77	1	...	8·468	W.B.
β 648 ...	18 53	86 21	225·1	1·33	1	6·0 9·2	6·474	D.
			233·2	1·27	4	...	6·622	L.
			229·2	1·36	1	...	7·438	W.B.
			231·2	1·14	4	...	7·540	L.
			230·2	1·50	1	...	8·539	L.
			228·3	1·24	2	...	8·668	B.
β 649 ...	18 54	57 42	7·9	1·44	2	8·2 10·6	7·751	L.
			2·8	1·76	1	...	8·706	B.
Σ 2438 ...	18 56	31 56	Round	...	1	7·2 7·7	7·417	L.
Σ 2437 ...	18 57	69 57	55·4	0·68	1	7·8 8·2	7·553	W.B.
ζ Aquilæ ...	19 1	76 17	56·8	5·87	4	3·0 15·0	6·639	L.
Σ 2454 ...	19 2	59 43	244·6	0·88	1	8 9	7·438	W.B.
			241·6	0·98	1	...	7·449	L.
			248·1	0 98	1	...	8·706	B.
Σ 2455 ...	19 3	67 59	79·2	3·47	1	7 8	7·501	L.
			83·1	3·59	1	...	7·528	W.B.
			83·2	3·81	1	...	8·775	B.
Σ 2488 ...	19 11	70 9	328·6	1·40	1	8·5 9·7	6·591	L.
			325·7	1·73	1	...	6·657	W.B.
			324·9	1·48	1	...	7·534	L.
			330·4	1·65	2	...	7·554	W.B.
OΣ 368 ...	19 11	74 1	212·1	0·96	1	8 9	6·507	L.
			213·6	0·98	1	...	7·534	L.
			213·2	0·88	2	...	7·554	W.B.
OΣ 371 ...	19 12	62 42	160·0	0·79	2	7 7	6·619	L.
			155·8	0·73	2	...	7 520	L.
			155·6	0·79	2	...	7·543	W.B.
			158·0	0·83	1	...	8·468	L.
β 1256 ..	19 14	83 51	40·1	...	1	8·3 8·3	7·761	B.
			36·1	0·60	1	...	8·739	B.
β 141 A.B.	19 18	67 42	81·6	0·84	1	7·5 8·5	7·567	L.
			78·9	0·86	1	...	7·950	W.B.

Star's Name.	R.A. 1900. h m	N.P.D. 1900. ° ′	Position Angle. °	Distance. ″	No. of Nights	Mags.	Epoch 1890+	Obs.
β 141 C.D.	19 18	67 42	183·0	5·75	1	10·2 10·5	7·567	L.
			181·7	5·39	1	...	7·950	W.B.
Σ 2525 ...	19 22	62 54	147·2	0·51	4	7·4 7·6	6·595	L.
			323·9	0·39	5	...	7·695	L.
			317·3	0·50	3	...	8·621	L.
			319·8	0·39	1	...	8·739	B.
Σ 2536 ...	19 27	72 25	68·3	1·86	1	8·0 11·0	6·556	L.
			72·6	1·60	1	...	8·520	L.
			76·0	1·63	2	...	8·521	B.
*	19 27	72 9	341·0	11·30	1	10·5 11·0	6·556	L.
Σ 2539 ...	19 28	61 57	362·2	5·57	2	7·9 9·7	6·506	L.
			362·2	5·91	1	...	8·518	B.
			359·6	5·34	1	...	8·523	W.B.
OΣ 375 ...	19 30	72 7	137·5	0·58	2	8·0 9·0	6·561	L.
Σ 2556 ...	19 35	67 58	142·3	0·44	3	7·3 7·8	6 587	L.
			145·9	0·48	1	...	8·739	B.
β 1132 ...	19 39	63 18	227·1	0·47	2	8·3 8·7	7·679	L.
β 658 ...	19 40	63 9	291·1	0·50	3	6·7 9·7	7·630	L.
Σ 2579 (δ Cygni)	19 42	45 7	121·8	1·51	1	3 8	7·539	L.
			131·4	1·15	1	...	8·953	B.
A.G.C. 11 (ζ Sag.) A.B.	19 44	71 7	163·9	0 19	1	4·5 6·0	7·693	L.
			163·9	0·38	2	...	8·773	L.
			170·9	0·47	2	...	8·809	B.
			151·5	0·33	1	...	8·843	W.B.
Σ 2585 A.C.	...	...	311·9	8·79	1	4·5 8·0	7·693	L.
			311·9	8·51	2	...	8·773	L.
			310·4	8·73	1	...	8·780	B.
OΣ 387 ...	19 45	54 57	347·7	0·48	1	7·5 8·0	6·559	L.
			344·5	0·52	2	...	7·782	L.
			342·0	0·40	1	...	8·534	L
			339·6	0·53	1	...	8·717	W.B.
A.C. 16 ...	19 53	63 2	230·9	0·39	2	7 9	7·685	L.
			238·7	0·49	2	...	8·726	W.B.
β 425 ...	19 53	69 59	242·1	1·28	1	8·4 8·5	6·613	L.
			241·5	1·32	5	...	8·585	W.B.
Σ 2607 A.B. (OΣ 392)	19 54	48 0	299·7	0·45	1	7 9	8·704	L.
A.C.	...	...	109·4	3·21	1	7 9	8·704	L.
β 1133 ...	19 56	58 27	335·4	0·68	2	6 8 9·5	7·645	L.

Star's Name.	R A. 1900.	N.P.D. 1900.	Position Angle.	Distance.	No. of Nights.	Mags.	Epoch 1890+	Obs.
	h m	° ′	°	″				
β 1133 ...	19 56	58 27	337·4	0·73	1	6·8 9·5	8·734	W.B.
β 439 ...	19 56	60 23	241·8	3·28	1	7·9 12·7	7·750	L.
β 1258 ...	19 56	60 23	153·2	1·23	1	8·0 10·7	7·780	L.
			156·3	1·35	1	...	8·734	W.B.
OΣ 395 ...	19 58	65 21	284·2	0·72	1	5·5 6·0	6·690	D.
			276·7	0·62	1	...	6·613	L.
			282·2	0·55	1	...	7·570	W.B.
			277·2	0·81	1	...	8·704	L.
β 1206 ...	20 15	53 35	359·7	1·80	1	7·8 10·8	7·737	L.
Σ 2695 ...	20 27	64 39	82·2	1·20	1	6·2 8·0	6·690	D.
			76·3	1·12	1	...	6·613	L.
			77·7	0·93	1	...	7·528	L.
			78·1	1·08	1	...	7·562	W.B.
			77·7	1·27	1	...	8·548	C.
			76·7	0·78	2	...	8·678	W.B.
β 151 A.B. (β Delph.)	20 33	75 45	4·7	0·66	1	4·5 6·0	8·753	L.
Σ 2704 A.C.	20 33	75 45	117·8	26·17	1	4·5 11·0	8·753	L.
A.B.	...	...	333·3	37·32	1	4·5 11·0	8·753	L.
Hough 137 .	20 36	60 34	285·8	1·10	1	7·0 10·0	6·742	L.
			281·2	0·95	1	...	7·664	W.B.
			283·8	0·98	2	...	8·702	W.B.
Σ 2714 ...	20 36	60 34	339·0	5·06	1	8·5 12·0	8·742	L.
β 64 ...	20 40	77 40	183·8	0·57	1	8·3 8·3	7·576	W.B.
			186·3	0·49	1	...	7·821	D.
			188·6	0·55	1	...	8·753	L.
Σ 2737 A.B. (ε Equul.)	20 54	86 5	284·7	0·85	2	5·7 6·2	8·757	B.
A.C.	...	...	74·1	10·37	1	5·7 7·1	8·739	B.
Σ 2744 ...	20 58	88 51	172·1	1·45	1	6·3 7·0	6·572	W.B.
			166·1	1·80	1	...	7·794	B.
			166·8	1·51	1	...	8·794	B.
β 156 ...	20 58	43 50	247·6	1·11	2	7·5 9·9	6·644	L.
β 69 ...	20 58	68 43	311·7	0·72	1	8·3 9·1	6·717	L.
			315·2	1·02	2	...	7·652	W.B.
			311·1	0·97	1	...	8·711	W.B.
			313·9	0·85	1	...	8·726	L.
β 1138 ...	20 59	44 36	189·2	0·36	1	7·2 8·5	7·920	L.
Σ 2749 A.B.	21 0	86 52	155·6	3·10	1	7·7 8·9	8·794	B.
B.C.	...	...	152·7	0·74	1	8·9 10.0	8·794	B.

Star's Name.	R.A. 1900. h m	N.P.D. 1900. ° ′	Position Angle. °	Distance. ″	No. of Nights.	Mags.	Epoch 1890+	Obs.
β 679 ...	21 2	46 43	54·0	0·42	1	10·0 10·0	6·559	L.
Ho. 152 ...	21 8	62 7	320·6	0·68	1	8·5 9·5	7 701	W.B.
			319·1	0·51	1	...	8 711	W.B.
			324·1	0·57	1	...	8·720	L.
A.G.C. 13 (τ Cygni)	21 11	52 23	340·9	0·48	2	3·9 10 0	6·643	L.
			311·2	0·58	1	...	8·819	L.
Σ 2799 (20 Peg.)	21 24	79 21	118·3	1·69	1	7·0 7·0	6·657	W.B.
			117·1	1·40	2	...	7·564	W.B.
			117·1	1·27	2	...	8·693	W.B.
			120·7	1·27	1	...	8·723	L.
			118·0	1·33	1	...	8·775	B.
Σ 2804 ...	21 28	69 44	331·2	3·42	1	7·3 8·0	6·561	D.E.
			331·8	3·16	3	...	6·620	W.B.
			...	2·92	1	...	6·709	D.
			335·0	2·95	1	...	6·709	C.
Σ 2822 (μ Cygni)	21 40	61 42	122·6	2·83	1	4·0 5·0	6·572	L.
			121·6	2·84	1	...	7·526	W.B.
			124·2	2·80	1	...	7·761	B.
			125·0	2·93	1	...	8·611	L.
Σ 2824 A.C. (κ Pegasi)	21 40	64 51	297·7	12·16	1	3·9 10 8	6·695	L.
			297·7	12·00	1	...	7·865	L.
			298·8	12·45	3	...	8·712	L.
β 989 A.B.... (κ Pegasi)	21 40	64 51	86·8	0·12	3	3·9 5·0	6·518	L.
			75·0	0·06	3	...	6·765	L.
			27·0	0·09	4	...	7·570	L.
			16·6	...	1	...	7·768	L.
			4·8	...	1	...	7·800	D.
			342·0	...	1	...	7·901	L.
			312·2	0·29	1	...	8·605	L.
			298·1	0·25	2	...	8·708	L.
			291·7	0·32	1	...	8·843	W.B.
			287·8	0·39	1	...	8·917	W.B.
			286·0	0·29	2	...	8·932	L.
Σ 2825 ...	21 41	89 42	120·3	0·91	1	8 9	8·920	B.
β 75 ...	21 50	79 35	40·0	1·05	2	8·1 8·3	6·832	L.
			37·6	1·01	1	...	6·827	W.B.
			40·4	1·07	2	...	8·731	W.B.
Σ 2849 ...	21 53	70 19	...	0·87	1	8·2 10·7	6·827	L.
			265·6	1·40	2	...	8·731	W.B.

Star's Name.	R.A. 1900.	N.P.D. 1900.	Position Angle.	Distance.	No. of Nights.	Mags.	Epoch 1890+	Obs.
	h m	° ′	°	″				
*	21 53	69 42	92·3	3·60	1	10·0 11·0	6·827	L.
β 699 ...	22 8	82 50	186·3	0·96	1	8·0 12·0	6·805	L.
Σ 2878 ...	22 9	82 33	123·0	1·37	1	6·5 8·0	6·805	W.B.
			126·9	1·37	2	...	6·816	L.
			122·8	1·26	2	...	7·657	W.B.
			126·9	1·32	1	...	8·717	W.B.
			133 6	1·21	2	...	8·757	B.
Σ 2881 ...	22 10	60 57	99·3	1·72	3	7·7 8·2	6·792	L.
			99·2	1·57	4	...	7·751	W.B.
			101·6	1·61	2	...	8·653	L.
			97·8	1·38	2	...	8·678	W.B.
			97·7	1·75	1	...	8·838	B.
β 1216 ...	22 15	61 2	314·5	0·46	2	8·4 8·7	6 735	L.
			311·4	0·35	1	...	7·764	L.
			310·9	0·54	1	...	7·694	W.B.
			314·2	0·54	3	...	8·675	L.
Σ 2900 ...	22 19	69 40	178 6	1·80	1	6·0 9·2	6·750	C.
			183·9	1·48	2	...	6·787	D.
			179·5	1·36	1	...	6·805	L.
			177·4	—	1	...	6·805	W.B.
			180·1	1·47	1	...	7·737	L.
			183·3	1·74	1	...	7·972	W.B.
			173·3	1·17	3	...	8·789	W.B.
			177·8	1·51	1	...	8·838	B.
β 172 ...	22 19	95 23	10·5	0·88	2	5·6 6·0	8·788	B.
β 1218 ...	22 23	60 52	52·1	1·72	1	8·6 8·8	6·728	L.
			55·2	1·46	2	...	6·865	W.B.
			55·2	1·53	4	...	7·677	W.B.
			54·6	1·61	1	...	7·764	L.
			50·8	1·59	3	...	8·675	L.
			52·2	1·48	2	...	8·678	W.B.
Σ 2912 ...	22 25	86 6	117·8	—	1	6·5 7·8	7·890	L.
			119·6	0·27	2	...	8·885	L.
			124·2	0·51	1	...	8·953	B.
Σ 2934 ...	22 37	69 6	144·9	0·96	1	8·2 9·2	6·750	D.
			146·9	0·92	1	...	6·750	C.
			144·5	0·78	4	...	8·777	W.B.
			141·5	0·77	1	...	8·816	B.

Star's Name.	R.A. 1900. h m	N.P.D. 1900. ° ′	Position Angle. °	Distance. ″	No. of Nights.	Mags.	Epoch 1890+	Obs.
β 1144 B.C. (η Peg.)	22 38	60 18	82·9	0·24	1	10 10	7·764	L.
			90·0	0·36	3	...	8·675	L.
β 710 ...	22 38	60 52	237·8	0·47	1	8·0 8·5	7·764	L.
			235·1	0·39	3	...	8·675	L.
β 711 ...	22 40	79 20	46·4	0·72	1	9 10	7·758	W.B.
			39·6	—	1	...	7·972	B.
			42·7	1·00	1	...	8·734	W.B.
			45·1	1·00	1	...	8·794	B.
			39·8	0·82	1	...	8·890	L.
Σ 2944 A.B.	22 42	94 47	261·8	3·52	1	7·0 7·5	7·871	B.
			259·9	3·41	1	...	8·745	W.B.
			255·4	3·49	1	...	8·775	B.
A.C.	...	...	131·1	47·82	1	7·0 8·0	8·775	B.
β 1146 ...	22 43	59 26	331·1	0·19	1	7·2 8·2	7·800	L.
β 382 ...	22 49	45 47	223·8	0·73	1	7·3 8·8	6·558	L.
			225·7	0·97	1	...	7·819	D.
			225.1	0·64	1	...	7·966	W.B.
O Σ 536 ...	22 53	81 10	185·9	0·32	1	7·3 7·4	6·827	L.
O Σ 483 ...	22 53	78 48	217·6	0·92	1	6·0 7·5	6·709	D.
			209·8	1·08	3	...	6·806	C.
			213·3	0·99	1	...	6·827	L.
Ho. 64 ...	23 2	68 54	86·1	0·37	1	7 7	7·975	L.
Σ 2995 ...	23 12	92 4	28·8	4·91	2	7·7 8·0	8·805	W.B.
β 80 ...	23 13	85 9	330·0	0·60	1	8·1 8·7	8·778	W.B.
			339·6	0·51	1	...	8·994	B.
β 1222 ...	23 23	87 0	31·8	1·04	1	9 9	8·745	W.B.
Σ 3018 A.C.	23 25	59 53	25·6	19·01	1	7·2 9·0	6·717	L.
			25·2	18·98	1	...	7·953	L.
			21·2	18·86	1	...	8·701	L.
β 1266 A.B.	23 25	59 53	232·0	0·28	2	7·2 7·5	6·778	L.
			221·6	0·36	1	...	7·944	L.
			234·0	0·35	1	...	8·711	L.
β 720 ...	23 29	59 14	157·7	0·37	3	5·5 5·5	6·761	L.
			164·5	0·43	1	...	7·819	D.
			160·2	0·33	2	...	7·927	L.
			158·2	0·50	1	...	8·780	L.
			159·2	0·39	1	...	8·909	W.B.
			151·1	0·34	1	...	8·969	B.

Star's Name.	R.A. 1900. h m	N.P.D. 1900. ° ′	Position Angle. °	Distance. ″	No. of Nights.	Mags.	Epoch 1890+	Obs.
β 858 ...	23 36	58 0	268·0	0·61	1	8·0 8·2	6·717	L.
			261·9	0·67	3	...	7·790	W.B.
			269·6	0·71	1	...	7·819	D.
			267·1	0·75	1	...	8·726	L.
			267·4	0·81	1	...	8 868	W.B.
A.G.C. 14 ...	23 29	61 12	215·9	1·17	1	5·5 9·7	6·704	W.B.
			202·9	1·28	1	...	6·838	L.
			194·5	1·55	1	...	7·739	W.B.
			195·0	1·48	1	...	7·953	L.
			195·8	1·39	2	...	8·740	W.B.
			190·2	1·49	1	...	8·868	L.
β 1223 ...	23 40	85 29	294·8	1·19	1	8 11	7·958	L.
Barnard ...	23 42	85 18	161·8	0·37	1	8·6 8·6	7·958	L.
Σ 3050 ...	23 54	56 51	211·9	2·79	3	6·0 6·0	6 736	W.B.
			210·0	...	...	...	7·871	B.
			212·7	2·25	2	...	7·921	W.B.
			213·0	2·58	3	...	8·931	B.
β 733 A.B.	23 57	63 26	216·1	0·76	1	6·0 11·0	7·975	L.
			225·5	0·59	2	...	8·796	L.
β 281 ...	23 58	88 26	203·3	1·53	1	8 10	7·958	L.
Σ 3056 ...	23 59	56 20	147·0	0·50	2	7 8	7·870	W.B.
			145·5	0·46	1	...	7·953	L.
			149·8	0·63	3	...	8·921	B.
			151·3	0·70	1	...	8·948	W.B.

Double Star Observations, 1897–98. By J. L. Scott.

The following measures of Southern double stars were made with a 5-inch equatorial refractor, O.G. by Casella, mounting by T. Cooke & Sons. The double parallel wire micrometer is also by these makers, the value of one revolution of the screw, as determined by transits of circumpolar stars, being 24″·180.

Bright field illumination.

Star's Name.	Mags.	R.A. h m	S. Dec. ° ′	P.A. °	Distance. ″	Date. 1890 +	Power.
β 391 (κ′ Sculptoris)	6½, 6½	0 4	28 33	272·2	1·15	7·936	230
				270·5	1·20	7·939	,,
				270·9	1·08	7·967	,,
				271·3	1·00	7·975	,,
				271·2	1·11		
h 1957	7, 8½	0 17	23 34	23·4	6·09	7·923	162
				21·6	6·20	7·931	,,
				22·5	6·15		
Ll 1662... ...	7½, 7½	0 53	16 15	216·4	6·58	7·904	162
				215·5	6·43	7·906	,,
				216·0	6·50		
Σ 91 (Ll 1965)	7½, 8½	1 02	2 18	322·4	4·23	7·745	230
				320·5	4·11	7·747	,,
				321·9	4·38	7·750	,,
				321·6	4·24		
42 Ceti (Σ 113)	6¼, 7½	1 14	1 1	354·9	1·20	7·747	230
				353·5	1·32	7·750	,,
				354·2	1·26		
h 2036	7½, 7½	1 15	16 20	16·4	1·52	7·887	230
				15·9	1·60	7·904	,,
				16·8	1·57	7·917	,,
				16·4	1·56		
A.G.C. 1299 ...	6½, 8¾	1 16	19 44	74·9	5·22	7·747	162
				74·8	5·12	7·767	,,
				74·9	5·17		

Star's Name.	Mags.	R.A. h m	S. Dec. ° ′	P.A. °	Distance. ″	Date. 1890 +	Power.
β 745 (λ Sculptoris)	6, 8	1 31	30 26	94·8	1·80	7·904	230
				93·7	1·86	7·912	,,
				93·9	1·94	7·923	,,
				94·1	1·87		
Lac 485... ...	$7\frac{1}{2}$, 8	1 34	38 6	274·8	19·55	7·904	162
				274·9	18·95	7·906	,,
				274·9	19·25		
Σ 147	$5\frac{1}{2}$, $7\frac{1}{2}$	1 37	11 50	87·2	3·92	7·887	162
				86·3	4·18	7·893	,,
				86·8	4·05		
229 Ceti ...	7, $7\frac{1}{4}$	1 54	23 24	306·2	8·12	7·893	162
				306·4	8·49	7·904	,,
				306·3	8·30		
Ll 4219... ...	8, $8\frac{1}{4}$	2 10	18 47	346·1	1·98	7·887	230
				346·6	2·04	7·904	,,
				346·4	2·01		
Σ 280	8, 8	2 28	6 10	348·9	3·63	7·917	162
				348·6	3·76	7·923	,,
				348·8	3·70		
h 3506	5, 8	2 29	28 40	243·9	10·60	7·904	162
				245·6	10·40	7·906	,,
				244·8	10·50		
h 3532	$6\frac{1}{2}$, $8\frac{1}{2}$	2 44	37 50	148·7	5·05	7·904	162
				149·3	5·42	7·906	,,
				149·0	5·29		
θ Eridani ...	3, 4	2 54	40 43	85·7	8·60	7·936	105
				84·9	8·52	7·939	,,
				85·2	8·58	7·945	,,
				85·3	8·57		
h 3555 (12 Eridani)	3, 8	3 8	29 23	328 2	1·70	7·895	230
				330·5	1·55	7·912	,,
				329·4	1·63		

Star's Name.	Mags.	R.A. h m	S. Dec. ° ′	P.A. °	Distance. ″	Date. 1890 +	Power.
h 3565	$5\frac{3}{4}, 8\frac{1}{2}$	3 14	18 56	115·4	6·10	7·904	162
				115·7	6·29	7·906	,,
				115·6	6·20		
h 3597 (*f* Eridani)	$4\frac{3}{4}, 5\frac{1}{2}$	3 45	37 56	205·1	7·30	7·912	162
				205·7	7·42	7·917	105
				205·4	7·36		
h 3611	$7, 7\frac{1}{2}$	3 53	40 16	142·9	4·05	7·901	162
				143·4	4·20	7·906	,,
				143·2	4·13		
40 Eridani (A B)	4, 9	4 10	7 47	105·4	82·40	7·912	105
				105·1	82·10	7·917	,,
				105·3	82·25		
Ll 8521... ...	7, 9	4 24	25 28	351·5	6·75	7·936	162
				352·4	6·52	7·939	105
				351·9	6·88	7·945	,,
				351·9	6·72		
33 Orionis ...	6, 8	5 25	N. 3 12	26·3	1·75	7·939	230
				25·4	2·05	7·967	,,
				25·7	1·88	7·975	,,
				25·8	1·89		
52 Orionis ...	$6, 6\frac{1}{2}$	5 42	N. 6 28	208·4	1·40	8·008	230
				208·3	1·52	8·011	,,
				209·0	1·35	8·016	,,
				208·5	1·42		
β 201 (Ll 14925)	7, 8	7 33	20 0	333·2	2·85	8·096	230
				332·6	2·70	8·110	,,
				332·9	2·78		
β 210	$6\frac{1}{2}, 6\frac{1}{2}$	8 51	16 58	183·7	2·50	8·085	230
				183·2	2·56	8·096	,,
				183·5	2·62	8·110	,,
				183·5	2·56		
Σ 1788	$7, 8\frac{1}{2}$	13 48	7 31	77·6	2·80	8·416	230
				75·1	3·01	8·419	,,
				77·7	3·20	8·424	,,
				76·8	3·00		

Star's Name.	Mags.	R.A. h m	S. Dec. ° ′	P.A. °	Distance. ″	Date. 1890 +	Power.
β 106 (μ Libræ)	5½, 6½	14 42	13 39	345·1	1·60	8·416	230
				344·4	1·56	8·419	,,
				344·8	1·58		
P xiv. 212 ...	6, 8	14 50	20 53	293·3	15·84	8·416	162
				293·1	16·20	8·419	,,
				293·2	16·02		
β 350 (B.A.C. 5020)	6½, 8	15 10	27 13	156·2	1·40	8·485	230
				154·8	1·15	8·496	,,
				156·6	1·18	8·498	,,
				155·9	1·24		
h 4755	8, 9	15 13	36 20	201·8	4·42	8·496	162
				202·5	4·11	8·498	,,
				202·2	4·27		
β 122	7, 7½	15 34	19 27	208·5	1·90	7·490	230
				207·4	1·78	7·493	,,
				208·0	1·84		
β 36 (2 Scorpii)	5, 9	15 47	25 2	275·4	2·85	8·482	230
				274·2	3·00	8·496	,,
				276·8	2·78	8·501	,,
				275·5	2·88		
η Lupi	4, 8½	15 53	38 6	20·4	14·65	8·465	162
				20·8	14·90	8·468	,,
				20·6	14·78		
Stone 8722 ...	7½, 8	15 57	32 47	344·8	2·90	8·496	230
				345·2	...	8·501	,,
				346 3	3·05	8·504	,,
				345·0	2·92	8·509	,,
				345·3	2·96		
ξ Scorpii (A B)	4½, 5	15 58	11 4	212·5	Elongated	7·482	230
				218·0	,,	7·487	,,
				215·0	,,	7·490	,,
				216·0	,,	7·493	,,
				217·1	,,	7·496	,,
				215·7	...		

Star's Name.	Mags.	R.A. h m	S. Dec. ° ′	P.A. °	Distance. ″	Date. 1890 +	Power.
ν Scorpii (C D)	7, 8	16 5	19 10	49·0	2·00	7·482	230
				48·2	2·05	7·487	,,
				48·9	2·02	7·490	,,
				48·7	2·02		
h 4840	8, 9	16 10	34 35	297·2	4·84	8·501	162
				297·9	5·15	8·504	,,
				297·6	5·00		
h 4889	6, 9	16 44	37 20	6·8	6·95	7·482	162
				7·3	7·06	7·487	,,
				7·0	7·00		
β 416	6, 8	17 12	34 53	310·8	1·54	7·446	230
				308·7	...	7·452	,,
				310·6	2·00	7·463	,,
				309·6	1·98	7·468	,,
				307·0	1·63	7·479	,,
				310·7	...	7·482	,,
				305·2	...	7·490	,,
				307·9	1·86	7·496	,,
				308·8	1·80		
Stone 9723 (A.G.C. 24226)	7, 8	17 43	30 31	188·2	10·25	7·490	162
				190·8	10·50	7·493	,,
				189·5	10·38		
70 Ophiuchi ...	4, 6	18 0	N.2 33	284·4	2·10	7·487	230
				281·7	2·05	7·490	,,
				283·2	2·18	7·496	,,
				285·1	2·05	7·498	,,
				282·8	2·20	7·507	,,
				283·5	2·08	7·512	,,
				283·5	2·11		
				274·0	2·15	8·468	230
				269·9	2·38	8·487	,,
				271·3	2·10	8·545	,,
				272·6	2·25	8·548	,,
				273·3	2·35	8·550	,,
				272·2	2·25		

Star's Name.	Mags.	R.A. h m	S. Dec. ° ′	P.A. °	Distance. ″	Date. 1890 +	Power.
β 132 (B.A.C. 6158)	7, 7¼	18 4	19 52	222·0	Elongated	7·594	230
				226·0	„	7·619	„
				224·0	...		
21 Sagittarii (Jacob 201)	5, 9½	18 19	20 36	286·9	1·68	8·542	230*
				289·4	1·89	8·545	„
				287·2	...	8·548	„
				287·9	1·70	8·550	„
				287·8	1·76		
β 133	7½, 7½	18 22	26 42	259·4	1·87	7·493	230
				260·5	1·57	7·498	„
				258·1	1·80	7·501	„
				259·3	1·75		
γ Cor. Australis	5½, 5½	18 59	37 13	155·3	1·60	7·446	230
				154·3	1·74	7·452	„
				154·8	1·52	7·455	„
				154·8	1·62		
				148·9	1·94	8·550	230
				151·5	1·79	8·556	„
				147·6	1·84	8·564	„
				146·8	2·02	8·575	„
				148·6	1·95	8·589	„
				148·7	1·91		
h 596 (Ll 36205)	7, 8	19 10	16 11	14·2	8·82	7·490	162
				13·3	8·68	7·493	„
				13·8	8·44	7·498	„
				13·8	8·65		
β 142	8, 8	19 22	12 21	332·7	1·45	7·687	230
				333·2	1·68	7·693	„
				330·8	1·30	7·695	„
				334·2	1·70	7·698	„
				332·7	1·53		
				333·3	1·50	8·641	230
				333·7	1·60	8·668	„
				333·5	1·55		

* Companion extremely faint and difficult.

Star's Name.	Mags.	R.A. h m	S. Dec. ° ′	P.A. °	Distance. ″	Date. 1890 +	Power.
h 5178 (Stone 10831)	7, 8¼	20 6	34 29	9·4	3·14	7·616	230
				10·3	2·93	7·619	,,
				9·9	3·04		
β 762 (Stone 10844)	7, 8	20 10	32 55	302·8	2·56	7·616	230
				304·7	2·42	7·619	,,
				303·8	2·49		
h 1537	8½, 8½	20 29	15 44	23·0	4·00	7·693	162
				22·7	3·80	7·695	,,
				22·5	4·15	7·698	,,
				22·7	3·98		
β 153	7½, 10	20 41	26 47	273·4	1·70	7·624	230*
				273·0	...	7·635	,,
				272·7	1·40	7·682	,,
				273·0	1·55		
h 3003	6, 9	20 47	24 10	213·7	2·05	7·611	230
				216·2	2·30	7·616	,,
				215·6	2·20	7·619	,,
				215·2	2·18		
A. G. C. 29052 ...	8, 9	21 4	23 37	302·1	9·91	7·641	162
h 3014 (Stone 11268)	8, 8	21 9	26 20	298·0	1·80	7·633	230
				297·0	1·92	7·635	,,
				296·3	2·00	7·641	,,
				297·1	1·91		
β 252	8¼, 8½	21 14	27 45	276·1	2·50	7·742	230
				277·5	2·60	7·745	,,
				276·8	2·55		
η Piscis Australis	6, 7	21 55	28 56	115·8	1·67	7·616	230
				115·5	1·70	7·619	,,
				115·8	1·72	7·624	,,
				115·8	1·70		
				115·9	1·60	8·641	230
				116	1·94	8·668	,,
				115·7	1·86	8·671	,,
				115·9	1·80		

* Companion extremely faint.

Star's Name.	Mags.	R.A. h m	S. Dec. ° ′	P.A. °	Distance. ″	Date. 1890 +	Power.
41 Aquarii ...	$6\frac{1}{2}, 8\frac{1}{2}$	22 9	21 34	116·0	5·08	7·742	162
				115·8	5·30	7·745	,,
				115·9	5·19		
53 Aquarii ...	$6\frac{1}{2}, 6\frac{3}{4}$	22 20	17 18	309·0	7·31	7·887	162
				308·6	7·18	7·893	,,
				308·8	7·25		
ζ Aquarii ...	$4, 4\frac{1}{4}$	22 23	0 32	321·8	3·30	8·641	162
				319·3	3·38	8·668	,,
				319·6	3·22	8·671	,,
				320·2	3·30		
Σ 2928	$8, 8\frac{1}{2}$	22 34	13 10	313·2	4·57	7·641	162
				313·7	4·40	7·643	,,
				313·4	4·49		
Σ 2935	$6\frac{3}{4}, 8\frac{1}{4}$	22 37	8 50	313·6	2·70	7·682	230
				312·8	2·66	7·685	,,
				313·2	2·68		
β 177	$8\frac{1}{2}, 8\frac{1}{2}$	22 46	22 20	277·8	2·20	7·676	230
				276·5	2·24	7·682	,,
				277·2	2·10	7·685	,,
				277·2	2·18		
h 5367 (γ Pisc. Austral.)	5, 8	22 47	33 24	269·5	3·70	7·912	162
				267·8	3·45	7·920	230
				268 7	3·58		
h 5371 (A.G.C. 31221)	$7\frac{1}{2}$, 9	22 52	26 38	343·9	9·17	7·676	162
θ Gruis	5, 8	23 1	44 4	24·1	2·80	7·917	230
				26·8	2·20	7·920	,,
				25·5	2·50		
Σ 2988	$7, 7\frac{1}{2}$	23 6	12 27	101·3	3·70	7·887	230
				101·0	3·62	7·893	162
				101·2	3·66		
Σ 2998 (94 Aquarii)	$6, 8\frac{1}{2}$	23 13	14 2	349·9	12·94	7·742	162
				349·8	13·28	7·745	,,
				349·9	13·11		

Star's Name.	Mags.	R.A.	S. Dec.	P.A.	Distance.	Date.	Power
		h m	° ′	°	″	1890 +	
h 3184	7, 8½	23 15	19 12	282·3	5·80	7·619	162
				283·0	5·15	7·641	,,
				282·7	5·48		
Σ 3008	8, 8½	23 18	9 2	244·3	4·40	7·923	162
				244·1	4·35	7·931	,,
				244·2	4·38		
ι^2 Aquarii ...	5½, 7	23 41	19 14	138·5	5·80	7·742	162
				139·1	5·94	7·745	,,
				138·8	5·87		
Brisbane 7342 ...	6, 6½	23 49	27 36	269·9	6·31	7·917	162
				269·6	6·55	7·931	,,
				269·8	6·43		
Σ 3046	8, 8½	23 50	10 10	245·6	3·05	7·687	162
				248·7	2·95	7·693	,,
				247·2	3·00		

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